The link between migratory background and crime perceptions. A repeated cross-sectional analysis with household data

Bortoletto, Gianluca

21 March 2022

The link between migratory background and crime perceptions. A repeated cross-sectional analysis with household data

1 Introduction

The present study takes into account the link between country of birth, proxy for migratory background, and crime perceptions in various European countries using EU-SILC micro-data.

Crime perceptions and fear of crime can affect mental health and they have implications on economic growth and wellbeing (Foster *et al*. 2016).[1] Various studies have tried to understand the determinants of fear of crime, some of them taking into account differences across race and ethnic groups.[2] In this study, the research interest is to understand the relationship between migratory background, proxied by country of birth, and crime perceptions. Moreover, other factors that may affect crime perceptions, borrowed from the SDT (Shaw and McKay 1942; Sampson and Groves 1987), are also considered and they are interacted with the country of birth to obtain the combined estimates of migratory background and the various socio-economic or environmental factors.

The present study contributes to the literature in three main ways. Firstly, while most of the studies take into account the impact of migratory background on its own (Pearson and Breetzke 2014), the present study also considers the joint coefficient with other factors (socio-economic background, housing deprivation, gender, etc.). Secondly, this is one of the few quantitative non-experimental studies on crime perceptions while most of the others are experimental quantitative (Foster *et al*. 2016) or qualitative studies (Lorenc *et al*. 2012; 2013a; 2013b).[3] Finally, the analysis concerns many households across different European countries in the period 2004-10 and exploits the EU-SILC dataset, while most of the analysis are carried out within a country or in a specific context (Hipp 2010; Callanan 2012).

The rest of the study is structured as follows. Subsection 4.1.1 outlines the hypotheses that the study tests specifically the link between migratory background and diversity and crime perceptions. Section 4.2 introduces the dataset and some descriptive statistics and correlations between variables. Section 4.3 presents the methodological approach used in the empirical analysis. Section 4.4 discusses the results of the empirical estimations. Section 4.5 provides some concluding remarks, policy implications and perspectives for future research.

[1] See also Lorenc *et al*. (2012; 2013a; 2013b).
[2] See, for instance, Callanan (2012).
[3] An analysis more similar than others to the one of the present study is the one by Callanan (2012), but the sample was much smaller than the one used in this study.

1.1 Hypotheses

This subsection presents the hypotheses that are to be tested throughout the study based on the main research question.

Although a theoretical framework as such does not exist with regard to the link between country of birth and crime perceptions, a number of previous studies dealt with this relationship empirically and provided qualitative and quantitative evidence. Many studies found that race is positively associated with perceptions of unsafety and fear of crime (Boateng and Adjekum-Boateng 2017; Box *et al*. 1988). On the contrary, some other studies found that fear was lower among ethnic and racial minorities compared to natives (Barton *et al*. 2017), however, this might be in line with the findings of Brunton-Smith and Sturgis (2011) who found that in neighbourhoods with low ethnic heterogeneity fear of crime is higher among ethnic minorities, while the reverse was true when the neighbourhood presented a high degree of racial diversity.[4] Some other studies found no significant and substantial impact of race on fear of crime (Clemente and Kleiman 1977).

Nevertheless, the bulk of studies seem to show that race and ethnicity are positively associated to higher fear of crime (Fox *et al*. 2009; Ortega and Myles 1987; Randa and Mitchell 2018).[5] Therefore, the first hypothesis is the following:

H1. Given the findings of many previous studies that showed that race and migratory background are positively and significantly associated with fear of crime at individual level, the expectation is that the country of birth (non-native heads of households) is positively and significantly associated with the probability of reporting crime as an issue of the neighbourhood.

Along with country of birth, other factors that measure the level of deprivation and concentrated disadvantage, borrowed from the SDT, that are likely to be correlated with higher fear of crime would be interacted with country of birth.[6] Given that SDT factors have been found to be linked to higher fear of crime, the second hypothesis is the following:

H2. Country of birth is expected to be significantly and positively associated with fear of crime as well as the SDT factors are as found by Brunton-Smith *et al*. (2013). Thus, the interactions between

[4] See also Alda *et al*. (2017) for race and confidence on the police and Cho and Ho (2018) for ethnic heterogeneity and perceptions of public safety.
[5] See also Shelley *et al*. (2021).
[6] Brunton-Smith *et al*. (2013) and Brunton-Smith and Sturgis (2011) found that social disorganization and the factors leading to it also affect the fear of crime.

country of birth and SDT factors are expected to have a positive and significant association with fear of crime.

The SDT factors considered in the present study are socio-economic deprivation, housing deprivation, environmental deprivation, monetary poverty, family disruption (measured by single parent households and disrupted marital status separately), are correlated with higher fear of crime and their interactions with the variables of interest would also yield a positive coefficient.
Some empirical studies have found that female gender is associated with higher fear of crime (Ortega and Myles 1987; Fox *et al*. 2009). Other studies have combined the effect of gender and race/ethnicity and found that women of an ethnic minority or from a different race compared to the majoritarian group are more likely to fear crime (Callanan 2012). For this reason, the third hypothesis that is addressed in this study is the following:

H3: Given that women and immigrants are more likely to be fearful of crime and given the results of previous studies that found that a positive effect from combining gender and ethnicity or migratory background, a positive and significant coefficient of the interaction term between female and country of birth is expected.

Other studies have found that the female gender to be a significant predictor for fear of crime and race or ethnicity to be negatively associated with it, although broadly not particularly significant (e.g., Reid and Konrad 2004 for fear of specific types of crimes). The interactions of gender and race have been proved significant also by Callanan and Rosenberg (2015), with female being more fearful of crime compared to men for most of the races.
The remaining of the study tests these hypotheses refer back to them when discussing the empirical results of the estimation.

2 Dataset and descriptive statistics

The main source of data is the cross-sectional European Union Survey on Income and Living Conditions (EU-SILC). The EU-SILC database has been used in many empirical analyses and can be either cross-sectional or longitudinal.[7] For instance, the longitudinal EU-SILC is used by many

[7] Iacovou *et al*. (2012) point out some of the strengths and weaknesses of using the EU-SILC database. One of the main advantages is that it allows comparing countries through time based on population characteristics.

authors to estimate the impact of individual characteristics on income levels and poverty.[8] In the present study, the longitudinal EU-SILC could not be used because the variables of interest are not included and can only be found in the cross-sectional EU SILC. Thus, the data framework used in the present study is a repeated cross-sectional. Although, this framework includes much heterogeneity as it is not possible to follow the same set of households and individuals over time, it allows to control for many factors and to have a large dataset including time-related dummies and country-region fixed-effects (Verbeek 2008).[9]

The data employed cover the period 2004-2010 and concern most of the EU-27 countries plus the UK and some EEA countries (Iceland and Norway), and Switzerland. This dataset is divided in four parts: the household file, the household register, the personal (individual level) file and the personal register. All the variables in the 4 databases are either self-reported through questionnaires or gathered through interviews.[10] The response to the interview for the household data is given by the member of the household, aged 15 and over, who is responsible for the accommodation. The present study matches individual level and household level data by only keeping the information for the household respondent. This way, the analysis is carried out at household level by having one row corresponding to one household in a specific country at a given year. Personal information for the households' respondents is also available and is used in the empirical analysis.

This way of analysing the various factors affecting fear of crime is in line with the approach followed by many studies. For instance, Alper and Chappell (2012) used data from a telephone survey where they asked to one person, aged 18 or older, representative of the household, various questions about fear of crime and vandalism. The data gathered through the survey were then analysed using personal characteristics of the household respondent and other contextual information to find out the most determinant factors leading to higher fear of crime, violence or vandalism.[11]

From the household file, most of the needed data for the empirical analysis are gathered. Information has been taken for crime perceptions, household type (single parent households), degree of urbanisation in the area where the household live (population density), monetary poverty indicator, socio-economic (non-monetary), housing and environmental deprivation. This information has been chosen in order to cover various aspects of the SDT that could affect crime perceptions. Building on this data, indexes of socio-economic (non-monetary), housing and environmental deprivation (have

[8] The framework is a rotating panel data that goes from 2003 onwards, that is, every two-three years the individuals included in the sample change and so it is not possible to build a long panel data going from 2003 until the latest date.
[9] See also Verbeek and Vella (2005).
[10] For some countries, the responses are gathered by combining both through interviews and registers (EU-SILC Documentation, 2006).
[11] A similar approach was used by Andreescu (2013) for investigating the fear of crime among foreign-born individuals. The author employed data from the European Social Survey (ESS) where they interview all people in the household who are aged 15 or over.

been created, and variables that measure urbanisation and population/residential density, and concentrated disadvantage have been obtained. Concentrated disadvantage measured through the variables of sex (female) of the household respondents, single-parent households, and monetary poverty. Housing and environmental deprivation and the degree of urbanisation partially proxy for residential mobility/instability, another important feature of the SDT framework (Shaw and McKay 1942; Sampson and Groves 1989; Sampson *et al*. 1997).

From the personal file, individual level data for the household respondents have been obtained and they concern their country of birth, sex, age, educational attainments and health status. These variables have been included in many studies considering their effects on fear of crime (Ortega and Myles 1987; LaGrange and Ferraro 1989; Reid and Konrad 2004; Franklin and Franklin 2009).

Table 4.A.39 in Appendix 4.A presents the comprehensive list of all the variables included in the empirical analysis, how they are measured, what is the source and how they can be interpreted.

The main dependent variable that is analysed in this study is a binary variable taking value 1 if the household reports crime or vandalism being a problem in the neighbourhood without a common standard for what has to be considered a problem. Given that SDT factors are used as predictors of crime perceptions due to their link with actual crime figures, it is interesting to note that this is confirmed by many previous studies such as Thornberry and Krohn (2002) or Vasiljevic *et al*. (2020), who found that self-reported measures of delinquency and crime are mostly accurate to represent actual crime and valid for analytical purposes.[12]

Given that migratory background has been found to be a significant predictor of crime perceptions, the variable of interest for the empirical estimation is the country of birth of the household respondents. The EU-SILC data also allows to use data on citizenship of the household heads, however, the choice of using the country of birth instead of the citizenship is due to data availability. Moreover, most of the literature on the effects of immigration used the birthplace to define international migration instead of the citizenship or nationality (Ottaviano and Peri 2012; Peri and Sparber 2009). For the country of birth , the data distinguish between natives, EU and non-EU born.[13] Thus, the variables of interest are two binary variables depending on the country of birth of the household respondent, and these are EU born, non-EU born, and native (i.e., native-born) that is the omitted category in the empirical estimation. From 2004 to 2007 countries who are defined EU in relation to country of birth are the EU-25 countries (but not the ones where the household resides or else will be categorised as native-born). From 2008 to 2010, country of birth coded as EU refers to EU-27 countries as Romania

[12] Other studies argue for validity of self-reported measures of crime, such as Huizinga and Elliott (1986), Maxfield *et al*. (2000) and Gilman *et al*. (2014).

[13] The EU-SILC, to be precise, distinguishes between EU (born in an EU-25 member country different from the residence one), LOCAL (native-born in the residence country) and OTH (born in a country other than the one of residence and other than EU, it includes also EFTA country and other geographically European countries not EU members).

and Bulgaria became members of the EU in 2007. Although the distinction between EU and non-EU born does not allow for specific characteristics of the country of birth or the ethnic or racial background at individual level, general immigration data at country level show that on average, in the period of analysis, around 89 percent of non-EU immigrants came from low and middle-income countries.[14] This statistics might suggest that, on average, non-EU migrants might be presenting lower socio-economic conditions compared to individuals residing in the countries of our sample (i.e., they are all European and high income countries) and, following the SDT, this might increase their probability of living in a socially disorganised area and of perceiving crime in the neighbourhood (Brunton-Smith and Sturgis 2011).[15]

Many of the variables that are listed in Table 4.A.31 in Appendix 4.A are included in the SDT models and are likely correlated to each other and so, for instance, a neighbourhood with strong social ties and lower anti-social behaviour might be located in an area of a city or town where socio-economic status is relatively higher compared to other neighbourhoods. This is also what is predicted by the SDT models (Shaw and McKay, 1942; Sampson and Groves, 1989; Bursik, 1988).

2.1 Descriptive statistics and correlation matrix

In this section, the descriptive statistics and the correlation matrix of the variables are presented. Table 1 below presents the descriptive statistics of the variables included in the main specifications. It is possible to see that crime is perceived as a problem with a probability of 14 percent on average and there is high variability given by the standard deviation being higher than the mean. Housing and socio-economic deprivation present a lower variability with the means higher than the respective standard deviations; on the other hand, environmental deprivation is more volatile. High urbanisation and monetary poverty conditions also vary substantially across households. Single parent households represent a small fraction of the whole dataset given that on average the probability of a household to be a single parent one is equal to 5 percent. Foreign-born as heads of households represent a minority in the dataset with the highest value being the probability of a non-EU born to be head of household on average equal to slightly less than 5 percent. Most of the households are female lead with the probability for a head of household to be female on average equal to around 55 percent. The average age of households respondents is equal to slightly more than 50 years old. In relative terms, most of the heads of households have an upper secondary educational attainment (high school) equal to 39 percent, while the probabilities of having a lower secondary education or higher education as highest

[14] We followed the classification of the World Bank for defining low and middle-income countries. The reported rates are obtained through our own calculations based on data from the International Migration Database (OECD 2020).
[15] See, for instance, Valentová and Alieva (2018) for differences in integration between EU and non-EU migrants.

educational attainments on average respectively equal to 17 and 27 percent; moreover, most of households' heads self-report a good or very good health status in general and on average the probability is slightly less than 60 percent across households. On the other hand, on average, the probability for a head of household to have an average (not good, not bad) health status is equal to 27 percent. The probabilities for households' heads to have a disrupted marital status (separated, widowed or divorced) and an inactive or unemployed activity status are respectively equal to around 25 and 24 percent.

Table 1 Descriptive statistics of the main empirical estimation

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Crime perceived as a problem	1226326	0.13	0.34	0	1
Housing deprivation	1226326	1.36	0.71	0	3
Socio-economic deprivation	1226326	1.83	1.81	0	9
Environmental deprivation	1226326	0.42	0.71	0	3
Urbanisation (high density)	1226326	0.41	0.49	0	1
Poverty indicator	1226326	0.17	0.37	0	1
Single parent households	1226326	0.04	0.20	0	1
EU born	1226326	0.03	0.17	0	1
Native-born	1226326	0.92	0.27	0	1
Non-EU born	1226326	0.05	0.21	0	1
Age	1226326	52.32	16.03	15	81
Age2	1226326	2994.29	1699.63	225	6561
Sex: female	1226326	0.55	0.50	0	1
Lower secondary education	1226326	0.17	0.38	0	1
Upper secondary education	1226326	0.39	0.49	0	1
Higher education	1226326	0.27	0.44	0	1
Good health status	1226326	0.60	0.49	0	1
Average health status	1226326	0.28	0.45	0	1
Disrupted marital status	1226326	0.24	0.43	0	1
Inactive-unemployed status	1226326	0.18	0.39	0	1

Table 3.32 excludes the dummy variables referring to the various types of households (e.g., one person household, 2 adults aged below 65 years without dependent children, 2 adults at least one aged 65 or older without dependent children, etc.), except the single parent household that is instead presented, because they are used as additional controls but they are not very meaningful in relation to the hypothesis to be tested and the literature on fear of crime. Moreover, these variables are not interacted with country of birth in the models with interaction terms.

The correlation matrix shown in Table 2 below presents the coefficients of correlation for the different variables. The probability of perceiving crime in the neighbourhood is positively and significantly

correlated to housing, socio-economic and environmental deprivation in line with Brunton-Smith *et al*. (2013). A high degree of urbanisation is also linked to higher probability of perceiving crime in the area of living in line with the findings by Wikström and Dolmén (2001).[16] The correlation between monetary poverty and crime perception is positive and significant, but modest in magnitude, in line with Kujala *et al*. (2019).[17] The dummy variable, related to whether the household is single parent is positively and significantly correlated to the probability of self-reporting crime as a problem in the area of living in line with studies such as Scarborough *et al*. (2010).[18] Non-EU born is positively correlated with crime perceptions in line with various studies such as (Ortega and Myles 1987; Fox *et al*. 2009).[19] Age and age squared are negatively correlated with crime perception at 1 percent level of significance. This is in line with the findings by LaGrange and Ferraro (1989). Female gender is also significantly and positively correlated to self-reporting crime as a problem in the area of living, in line with the reported findings by Cops and Pleysier (2011) although the author found the gap between females and males to be fluctuating over other characteristics (e.g., age groups). Higher education seems correlated to higher fear of crime, but this is in contrast with most of the literature (LaGrange and Ferraro 1989; Smith *et al*. 2001). Only one study reported positive coefficients of higher education on crime, but they were not significant (Wanner and Caputo 1987). Health status is also a social factor correlated to crime perceptions. Table 4.B.33 in Appendix 4.A shows a negative and significant correlation between a good health status and the probability of self-reporting crime, while the coefficient is positive in case of an average health status, and this is generally in line with the evidence that a better health is associated with lower fear of crime (Braungart *et al*. 1980; Stafford *et al*. 2007).[20] Family disruption, the share of people who are divorced, separated or widowed is positively and significantly correlated to higher fear of crime (Scarborough *et al*. 2010; Toseland 1982). Being inactive or unemployed is also positively and significantly correlated to the probability of self-reporting crime as a problem of the neighbourhoods and this is in line with the findings of previous studies (Will and McGrath 1995; Bennett and Flavin 1994).

For the correlation with the variables of interest, both EU and non-EU born are positively and significantly correlated to housing deprivation in line with Carter III (2011). Socio-economic deprivation at household level is negatively and significantly correlated to EU born as household heads. It is, on the contrary, positively correlated to non-EU born as household heads. This might reflect a better integration of EU migrants in a European country compared to non-EU ones as shown

[16] It is also in line with the predictions of the SDT by Sampson and Groves (1989) and the evidence by Jalil and Iqbal (2010) and Shopeju (2007) for actual crime rates.
[17] See also Pantazis (2000) for fear of crime in Britain.
[18] This is line with the predictions of the SDT by Sampson (1987).
[19] See also Houts and Kassab (1997).
[20] See also Jacoby *et al*. (2017) for the association between violent neighborhoods and low mental health.

by Valentová and Alieva (2018) for the differences in engaging in voluntary associations. Environmental and area deprivation is positively and significantly correlated to the variables of interest except for EU born for which is positive but not significant, and this seems to be in line with the evidence of local deprivation in the area of living for new migrants provided by Clark *et al*. (2019). Urbanisation and population density in the area of living of the household is positively and significantly correlated to all the variables of interest in line with what reported by Fitzgerald *et al*. (2014). Monetary poverty is positively correlated to foreign-born (both EU and non-EU) and this is partially in line with Bruner (2017) who investigated the link between race and poor neighbourhoods. Single parent households, proxy for concentrated disadvantage a factor considered in the SDT (Sampson 1987), are positively correlated to foreign-born as heads of households in line with Krivo *et al*. (1998). Foreign-born household respondents tend to be relatively younger than the average for household heads and this is in line with the fact that immigrants tend to be mostly young at time of arrival (Coleman 1992). Generally, there is a small, but positive and significant, correlation between the variables of interest, and the probability of having a higher education degree, and this is line with the findings by Chiswick and DebBurman (2004). The correlation is negative and significant with lower and upper secondary educational attainments. EU born household respondents are positively correlated to the probability of reporting a good health status, while the correlation is negative, but negligible and not significant for non-EU born and this seems to signal a healthy immigrant effect as described by McDonald and Kennedy (2004).[21] Foreign-born individuals are negatively correlated with the probability of being in a disrupted marital status, that is, divorced, separated or widowed and this is in line with Borjas and Bronars (1991). Non-EU born are positively and significantly correlated, although coefficients are modest in magnitude, with being unemployed or inactive as for the individual economic status, while this is not true for EU born. This seems in line with the evidence of a lower labour market outcomes among immigrants especially non-EU immigrants (Fellini and Guetto 2020; Nakhaie and Kazimur 2013). The variables of interest are also positively and significantly correlated to household size, and this is coherent with various reports such as Hogan and Eggebeen (1999).

The next sections introduce the empirical strategy used in the study and discuss the results of the estimations.

[21] For all variables of interests, the correlation is instead negative with the shares of people with an average (not good not bad) health status within households.

Table 2 Correlation matrix between the variables included in the main specification

	Crime perc.	Hous. depr.	Soc-econ. depr.	Env. depr.	High urban.	Pov. ind.	Single par.	EU born	Native-born
Crime perception	1								
Hous deprivation	0.10*	1							
Soc-econ. deprivation	0.08*	-0.10*	1						
Env. deprivation	0.30*	0.08*	0.14*	1					
High urbanisation	0.16*	0.29*	-0.05*	0.15*	1				
Poverty indicator	0.02*	-0.04*	0.31*	0.03*	-0.06*	1			
Single par.	0.03*	0.07*	0.10*	0.03*	0.03*	0.08*	1		
EU born	0.00	0.05*	-0.03*	0.00	0.03*	0.01*	0.01*	1	
Native-born	-0.02*	-0.12*	-0.04*	-0.03*	-0.09*	-0.05*	-0.02*	-0.61*	1
Non-EU born	0.03*	0.11*	0.07*	0.03*	0.09*	0.06*	0.02*	-0.04*	-0.77*
Age	-0.02*	-0.16*	0.05*	-0.02*	-0.03*	0.03*	-0.15*	-0.04*	0.05*
Age squared	-0.02*	-0.14*	0.05*	-0.02*	-0.03*	0.05*	-0.13*	-0.04*	0.04*
Female	0.03*	0.03*	0.14*	0.02*	-0.01*	0.06*	0.13*	0.00	-0.00
Lower sec. educ.	0.01*	-0.02*	0.09*	-0.00	-0.05*	0.09*	-0.00	-0.02*	0.01*
Upper sec. educ.	0.00*	0.05*	0.01*	-0.01*	-0.03*	-0.05*	0.03*	-0.02*	0.03*
Higher education	0.01*	0.15*	-0.25*	-0.00*	-0.14*	-0.22*	0.02*	0.03*	-0.05*
Good health	-0.04*	0.10*	-0.29*	-0.08*	0.04*	-0.11*	0.04*	0.04*	-0.01*
Average health	0.02*	-0.05*	0.12*	0.04*	-0.03*	0.05*	-0.02*	-0.03*	0.02*
Disrupted mar. stat.	0.02*	0.01*	0.18*	0.02*	0.02*	0.11*	0.19*	0.00	-0.01*
Inactive-unemployed	0.03*	-0.02*	0.20*	0.04*	-0.01*	0.26*	0.05*	0.00*	-0.01*

Table 2 (Continue)

	Non-EU born	Age	Age squared	Female	Lower sec. educ	Upper sec. educ.	Higher education	Good health
Non-EU born	1							
Age	-0.03*	1						
Age squared	-0.03*	0.99*	1					
Female	-0.00	-0.02*	-0.02*	1				
Lower sec. educ.	0.01*	0.06*	0.07*	0.02*	1			
Upper sec. educ.	-0.02*	-0.16*	-0.17*	-0.01*	-0.37*	1		
High education	0.04*	-0.16*	-0.17*	-0.02*	-0.28*	-0.49*	1	
Good health	-0.01*	-0.42*	-0.42*	-0.07*	-0.07*	0.06*	0.18*	1
Average health	0.00	0.25*	0.24*	0.03*	0.04*	-0.02*	-0.10*	-0.76*
Disrupted mar. stat.	0.01*	0.34*	0.35*	0.22*	0.05*	-0.05*	-0.10*	-0.21*
Inactive-unemployed	0.02*	-0.14*	-0.13*	0.20*	0.06*	-0.01*	-0.12*	-0.06*

Table 2 (Continue)

	Average health	Disrupted mar. stat.	Inactive-unemployed
Average health	1		
Disrupted mar. stat.	0.10*	1	
Inactive-unemployed	0.01*	-0.00*	1

* indicates a level of significance p<0.01.

Table 3.33 excludes the dummy variables referring to the various types of households (e.g., one person household, 2 adults aged below 65 years without dependent children, 2 adults at least one aged 65 or older without dependent children, etc.), except the single parent household that is instead presented, because they are used as additional controls but they are not very meaningful in relation to the hypothesis to be tested and the literature on fear of crime. Moreover, these variables are not interacted with country of birth in the models with interaction terms.

3 The empirical strategy

Two models were estimated: one without interaction terms between the variables of interest and selected control variables based on their relevance in predicting changes in crime perceptions, and one with interaction terms. Both models are estimated through OLS. This is done in order to compare the impact of the variables of interest *per se* and when combined with other factors leading to social disorganisation as predicted by the SDT models and, thus, higher fear of crime (Sampson 1987; Sampson *et al*. 1997; Brunton-Smith *et al*. 2013). The models to be estimated are presented at household level, that is, individual level variables have been aggregated at household level.
The baseline specification without interaction terms is:

$$Crm_{kjt} = \beta_0 + \beta_1 Cb_{kjt} + \beta_2 C_{kjt} + \delta_j + \gamma_t + r_{kjt} \qquad 4.1$$

where Crm_{kjt} is the probability of household k to self-report crime, violence or vandalism to be a problem of the area of living in country j at time t, Cb_{kjt} indicates either the country of birth of the household respondent who is the head of the household, separately for EU and non-EU born (these are two different dummy variables, one for EU born and one for non-EU born and the omitted category is native-born) for household $k$in country j and time t. C_{kjt} is a vector of control variables at household level, while δ_j and γ_t are respectively country fixed-effects and year dummies, while r_{kjt} is the residual term.
The control variables included in the model of Equation 4.1 above are the 3 indices of deprivation, housing, socio-economic and environmental deprivation, the degree of urbanisation, monetary poverty, single parent households, the age (and its square) of the household respondent, the sex that takes value 1 if the household head is of a female sex and 0 otherwise, three binary variables that take value 1 if the highest educational attainment is respectively a lower secondary education, upper secondary education or higher education one and 0 otherwise, two binary variables taking value 1 if the head of household's self-reported health status is a good health status (that includes also a very good self-reported health status) or an average health status and 0 otherwise, a dummy variable that takes value 1 if the household respondent reports being divorced, separated or widowed and 0 otherwise, a dummy variable that takes value 1 if the household head is inactive or unemployed as for the labour status and 0 otherwise and the household type.[22] The three deprivation indices have been chosen as relevant factors based on the various formulations of the SDT (Shaw and McKay

[22] See Table 3.A.31 in Appendix 3.A for the comprehensive list of variables included in the specification.

1942; Sampson 1987; Sampson *et al*. 1997) as they are expected to have an impact on actual crime rates and also fear of crime (Brunton-Smith *et al*. 2013).[23] The degree of urbanization in the area of living was also found to be relevant in affecting fear of crime (Wilkström and Dolmén 2001), thus, it has been chosen as a control variable for crime perceptions in this study. Monetary poverty is also related to higher probability of reporting crime as a problem of the neighbourhood although the effect was found to be modest in the previous literature (Kujala *et al*. 2019). Age is also another relevant factor that needs to be considered when exploring fear of crime (Tulloch 2000; LaGrange and Ferraro 1989). Many studies highlighted the importance of gender in determining differences in crime perceptions and, for this reason, the dummy for female sex of the household head has been included (Callanan and Rosenberg 2015; Ortega and Myles 1987). Educational attainments are also deemed as important in many studies investigating the factors that cause fear of crime (Smith *et al*. 2001; Krannich *et al*. 1989), and, therefore, the three dummies on educational attainments are included as control variables.[24] The health status has also been included as a factor potentially affecting crime perceptions following the procedure of many previous studies (Stafford *et al*. 2007; Chandola 2001; Cossman and Rader 2011). Marital status, namely whether the household respondent is separated, divorced or widowed, is also included in the estimation as a factor that could affect the fear of crime as it has been included in many previous studies (Toseland 1982; Weinrath and Gartrell 1996; Braungart *et al*. 1980). Unemployment and inactivity are deemed as relevant in affecting crime perceptions by the previous literature (Scarborough *et al*. 2010; Smolej and Kivivuori 2006). Household type has also been considered as a potential factor linked to the probability of self-reporting crime as a problem in the area of living as it was done in some of the previous studies analysing the determinants of crime perceptions (Liska *et al*. 1982; Miceli *et al*. 2004).

The same specification, with the addition of interaction terms, is then used to estimate the combined effects of the variable of interest, the place of birth of the household head, with some of the control variables. The equation is the following:

$$Crm_{kjt} = \beta_0 + \beta_1 Cb_{kjt} + \beta_2 F_{kjt} Cb_{kjt} + \beta_3 C_{kjt} + \delta_j + \gamma_t + r_{kjt} \qquad 4.2$$

where β_3 and β_4 are the vectors of the coefficients that respectively represent the combined effect of country of birth Cb_{kjt} with the vector F_{kjt} that includes some factors related to the SDT and other variables that might affect fear of crime that are a subset of all the control variables C_{kjt} for household

[23] See also Palmer *et al*. (2005).

[24] See also Scarborough *et al*. (2010) for another analysis investigating fear of crime and finding significant associations with educational attainments.

k in country j at time t. The variables included in F_{kjt} are the indices socio-economic deprivation, housing deprivation, environmental deprivation, the binary variables on monetary poverty, single parent household, the degree of urbanisation (population density), female sex for the household head, a divorced, separated or widowed marital status, the inactive-unemployed labour status. These factors are likely to lead to higher crime rates as predicted by the SDT and therefore to higher fear of crime (Brunton-Smith *et al*. 2013).

Given that these factors are expected to lead to higher crime rates and higher fear of crime (Shaw and McKay 1942; Sampson *et al*. 1997; Brunton-Smith *et al*. 2013),[25] and that ethnicity and race are also correlated with higher probability of reporting crime as a problem in the neighbourhood (Ortega and Myles 1987; Fox *et al*. 2009), the expectation is that the coefficients on the interaction terms are positive and significant on the probability of self-reporting crime as a problem in the area of living.

Both the models with and without interaction terms have been estimated using linear OLS estimators. Given that the dependent variable is a dummy (0, 1), one may decide to use a logit or probit estimator for estimating the effect of country of birth on crime perceptions. However, many authors have found that the two approaches yield very similar results, and, although probit might outperform OLS in terms of predicting the probability of an attribute (Pohlmann and Leitner 2003), the OLS supplies a "Best Linear Unbiased Estimation" (BLUE) in many circumstances, especially when there is no particular reason for assuming a non-linear relationship (in the parameters) between the variable of interest (country of birth in the case of this study) and the dependent variable (Krueger and Lewis-Beck 2008). Moreover, the OLS estimator provides coefficients that are easier to be interpreted when discussing the empirical results compared to a logit or probit estimator.

The next section presents the results of the empirical estimation.

[25] See also Sampson (1987), Sampson and Groves (1989) and Bruinsma *et al*. (2013).

4. Results of the empirical estimation

This section presents the results of the empirical estimation. Two main models are estimated: one without and one with interaction terms. The inclusion of the interaction terms gives the opportunity of assessing the joint impact between individual and household characteristics and the variables of interest. The results of these two models are presented in subsections 4.4.1 and 4.4.2 respectively when interactions are excluded and included.

Some specification tests are carried out for different subsamples. In the first of the specification tests, presented in subsection 4.4.3, a model for the period from 2004 to 2007 is estimated. Secondly, a model is estimated for the period from 2008 to 2010 and this is discussed in subsection 4.4.4 of the present study. This is done to account for potential increasing effects of the 2008 economic recession on the perceptions of crime or the actual crime rates. Bushway *et al*. (2012) found that recessions are associated with an increase in property crimes, while Klaer and Northrup (2014) found that GDP has an inversely proportional effect on violent crimes; in turn, actual crime rates are highly correlated to crime perceptions (Bug *et al*. 2015). Splitting the period also allows accounting for the access of Romania and Bulgaria into the EU that happened in 2007 (European Central Bank 2007).[26] Both these factors make it relevant to have separate specifications for the two periods.

Other specification tests are the ones for which the sample is separated between Central-Eastern European and Balkan countries on the one side and Western and Nordic countries on the other side. Central-Eastern European countries attracts less immigration compared to Western and Nordic ones as shown by various studies (Hooghe *et al*. 2008; Pedersen *et al*. 2008). For this reason, it is relevant to conduct the statistical analysis separately for the two groups of countries. The results of these checks are discussed in subsections 4.4.5 and 4.4.6 of this study.

4.1 Main specification without interaction terms

Column 2 of Table 3 shows the results for the overall sample without interaction terms. It is possible to notice that country of birth (both EU and non-EU) is not significantly associated to the probability of self-reporting crime issues. This result seems in line with Franklin *et al*. (2008) that found small differences in crime perceptions between ethnic minorities and natives and generally lower for ethnic minorities compared to natives. However, other studies such as Callanan (2012) found a significant positive association between migratory background and fear of crime or between race and crime. Similar results were also found in other studies (Chiricos 1997; Andreescu 2013).

[26] In the EU-SILC dataset Romanian and Bulgarian born are coded as EU instead of non-EU from 2008 onwards.

The findings point in the opposite direction compared to hypothesis H1 that was formulated in the previous subsection 4.1.1 for which migratory background, proxied by the country of birth of the heads of households in the present study, should have been associated with higher fear of crime based on most of the previous empirical evidence (Ortega and Myles 1987; Fox *et al*. 2009; Callanan 2012). Among the other factors, listed by the SDT models, all the deprivation indices (housing, socio-economic and environmental) are associated with a higher probability of self-reporting crime as a problem in the neighbourhood and the coefficients are highly significant. A high degree of urbanisation is also positively associated to the probability of self-reporting crime in the area of living. The findings for these variables are in line with the evidence by Brunton-Smith *et al*. (2013) that linked SDT models, such as Sampson and Groves (1989), to fear of crime.

The monetary poverty indicator is not significant in line with the findings by Kujala *et al*. (2019). Single parent households are also associated with higher probability of self-reporting crime as a problem in the neighbourhood and the coefficient is significant at 1 percent level in line with the predictions of the SDT model by Sampson *et al*. (1997) for actual crime rates and the findings by Renauer (2007) on fear of crime.

Age is associated to higher probability of self-reporting crime as a problem in the neighbourhood in line with Abdullah *et al*. (2014) and partially with Alper and Chappell (2012). However, for high increase in age, the link between being older and crime perceptions becomes negative, that is why the coefficient on age squared is negative and highly significant in line with the findings by Tulloch (2000) that older people fear less crime because of low perception of being at personal risk.

Female sex is associated with a higher probability of self-reporting problems of crime in the neighbourhood, but the effect is not significant contrary to most of the literature (Fox *et al*. 2009; Callanan and Rosenberg 2015) and partially in line with Cops and Pleysier (2011) who found that differences across gender for fear of crime are contingent on the age groups. Education is positively linked to crime perceptions in line with Ollenburger (1981) and Dowler (2003) although the coefficient is significant only for graduates of upper secondary education (e.g., high school graduates). A self-reported good health status, or average but not bad, is negatively associated with the probability of self-reporting crime as a problem in the area of living and this is coherent with the findings of Braungart *et al*. (1980). Both a disrupted marital status and an inactive or unemployed labour status are not significantly associated to the probability of self-reporting crime or vandalism as issues in the area of living. This is in line with Mesch (2000) that found no significant link between marital status and crime perceptions. Although measured at city level, also Franklin *et al*. (2008) found no significant link between unemployment and fear of crime. This is opposed to most of the literature

that, instead, found a positive and significant association between unemployment condition and fear of crime (Smolej and Kivivuori 2006; Hummelsheim *et al*. 2011).

4.2 Main specification with interaction terms

Column 3 of Table 3 presents the outcome of the regression with interaction terms. A subset of the control variables used in the specification of Column 2 are interacted with the variable of interest, country of birth (the base category is native). These variables have been chosen based on the predictions of the SDT that are aimed to explain differences in crime rates but are also determinant factors for fear of crime (Brunton-Smith *et al*. 2013).

EU born dummy by itself is positively and significantly associated to the probability of reporting crime as an issue of the neighbourhood. That means that married EU born men without any of the deprivation conditions are associated with around 1.6 percentage points higher probability to report crime as a problem of the area of living.[27] However, this coefficient is only significant at 10 percent level. This result seems to confirm hypothesis H1 that being foreign-born is associated to higher probability of reporting crime as a problem of the area of living, and somehow in line with Andreescu (2013) that finds that foreign-born people are more likely to fear of being victimised, although in the case of the present study the analysis concerns the probability of perceiving crime as a problem rather than perceptions about victimisation.

The interactions between housing deprivation and the variables of interest are mostly not significant, except between housing deprivation and EU born. For given levels of housing deprivation, being born an EU country other than the one the household is living in (given that most of the reference countries in our sample are EU countries) is associated with a lower probability of self-reporting crime as a problem in the neighbourhoods by around 1.6 percentage points compared to natives. This effect is similar to the one found by Vauclair and Bratanova (2017) although the authors focused on the joint effect of income inequality (measured at country level) and belonging to an ethnic minority. This result seems in contrast to hypothesis H1 for which the joint effect of country of birth and deprivation conditions (in this case housing deprivation) should be positive and significant on the probability of self-reporting crime as a problem of the neighbourhood.

[27] The marginal effects have been estimated in order to understand whether, in presence of all the deprivation conditions, the coefficients on EU and non-EU born are significantly associated to crime being a problem in the neighbourhood. These coefficients appear to be not significant as shown at the bottom of Table 3 below.

Table 3 Main estimation with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0241***	0.0254***
	(0.0042)	(0.0042)
Socio-economic deprivation	0.0109***	0.0113***
	(0.0010)	(0.0011)
Environmental deprivation	0.1267***	0.1265***
	(0.0050)	(0.0051)
High urbanisation	0.0743***	0.0750***
	(0.0064)	(0.0063)
Monetary poverty	-0.0029	-0.0014
	(0.0024)	(0.0035)
Single parent households	0.0130***	0.0142***
	(0.0033)	(0.0035)
EU born	-0.0109	0.0165*
	(0.0100)	(0.0082)
Non-EU born	-0.0171*	0.0132
	(0.0087)	(0.0090)
Age	0.0023***	0.0023***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.0000)	(0.0000)
Female	0.0007	-0.0002
	(0.0015)	(0.0015)
Lower secondary education	0.0052	0.0050
	(0.0037)	(0.0036)
Upper secondary education	0.0079**	0.0077*
	(0.0038)	(0.0037)
Higher education	0.0068	0.0065
	(0.0048)	(0.0047)
Good health	-0.0314***	-0.0315***
	(0.0035)	(0.0035)
Average health	-0.0126***	-0.0127***
	(0.0022)	(0.0022)
Disrupted marital status	-0.0018	-0.0026
	(0.0017)	(0.0018)
Inactive-unemployed	0.0034	0.0040
	(0.0020)	(0.0022)
Hous depr*EU born		-0.0159**
		(0.0076)
Hous depr*non-EU born		-0.0094
		(0.0076)
Ses depr*EU born		-0.0035**
		(0.0016)
Ses depr*non-EU born		-0.0047**
		(0.0019)

Table 3 (Continue)

Env depr*EU born		0.0014
		(0.0052)
Env depr*non-EU born		0.0038
		(0.0078)
High urb*EU born		-0.0036
		(0.0100)
High urb*non-EU born		-0.0124*
		(0.0069)
Mon pov*EU born		-0.0061
		(0.0050)
Mon pov*non-EU born		-0.0159***
		(0.0045)
Single par*EU born		-0.0347***
		(0.0101)
Single par*non-EU born		0.0029
		(0.0099)
Female*EU born		0.0045
		(0.0062)
Female*non-EU born		0.0128
		(0.0061)
Disr. mar stat*EU born		0.0142
		(0.0059)
Disr. mar. stat.*non-EU born		0.0064
		(0.0050)
Inact.-unempl.*EU born		0.0009
		(0.0058)
Inact.-unempl.*non-EU born		-0.0143**
		(0.0069)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0088
		(0.0087)
Non-EU born		-0.0081
		(0.0066)
Observations	1226326	1226326
R-squared	0.1253	0.1255
Constant	-0.0505	-0.0520
	(0.0173)	(0.0175)

The Table shows the results for country of birth (EU and non-EU born) with respect to native-born that is the omitted category. The coefficients for EU born, and non-EU born should both be interpreted with respect to the reference category. The same is true for the interaction terms, the coefficients of the joint terms should be interpreted with respect to the omitted category, that is, with respect to native-born.

Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

Cluster-robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Var1*Var2 in the first column, indicates the interaction term.

The interactions between country of birth and socio-economic deprivation yield small but highly significant negative coefficients for both EU and non-EU born. Namely, for a given level of socio-economic deprivation, being EU born and non-EU born is associated with a lower probability of self-reporting crime as a problem of the area of living respectively by around 0.4 and 0.5 percentage points

compared to native-born. This effect seems in line with the findings by Brunton-Smith and Sturgis (2011) who argued that ethnic minorities living in deprived areas are less likely to perceive fear of crime because of the immigrants concentration in the neighbourhoods they live in. This result seems also against hypothesis H2 for which socio-economic deprivation combined to country of birth should lead to higher fear of crime.

No significant interactions can be spotted between environmental deprivation and the variables of interest.

For high degrees of urbanisation, only the interaction term with non-EU born is significant but only at 10 percent level and shows that a non-EU born is associated to a lower probability of self-reporting crime as a problem of the area of living by slightly more than 1 percentage point compared to a native-born. This appears to be contrary to hypothesis H2 outlined in subsection 4.1.1 and seems in line with Brunton-Smith and Sturgis (2011).

For monetary poverty interactions, it is possible to spot a highly significant (1 percent level) negative coefficient for monetary poverty combined with non-EU born. It suggests that, given the situation of monetary poverty, being non-EU born is associated with a lower probability of self-reporting crime as a problem of the area of living by around 1.6 percentage points compared to natives in line with Vauclair and Bratanova (2017). This finding is also strongly against hypothesis H2 that states that deprivation, concentrated disadvantage combined with being foreign-born should be associated with higher fear of crime (i.e., higher probability of self-reporting crime as an issue of the neighbourhood).

For the interaction between single parent households with dependent children and the variables of interest, the coefficient of the interaction term with EU born is negative and significant at 1 percent level. Namely, for single parent households, respondents that are born in an EU member country (other than the reference one) are associated with a lower probability to report crime as a problem in the neighbourhood by around 3.5 percentage points compared to native born. This result appears to be consistent with Brunton-Smith and Sturgis (2011) that found that, being a member of a minority ethnic group in a situation of concentrated disadvantage and deprivation, increases the probability of being fearful of crime. However, this seems in contrast with hypothesis H2 stated in above subsection 4.1.1 and with the findings by Holmes (2003) that find a positive effect of being Hispanic and living in an area of concentrated minority disadvantage on fear of crime.

For inactivity and unemployment interactions with the variables of interest, the results show that given a situation of unemployment or inactivity, non-EU born households heads are associated with an around 1.4 percentage points lower probability to self-report crime as a problem in the area of living compared to native born ones and the estimate is significant at 1 percent level. This seems in line with the impact for income inequality found by Vauclair and Bratanova (2017) and is in contrast

with hypothesis H2 that states that, given a condition of deprivation, a foreign-born should be more likely to perceive crime as an issue of the area of living.

Overall, the model with interaction terms fits better the data as the R-squared is higher than the one of the model without interaction terms. However, most of the coefficients are not significant and modest in magnitude, at most equal to 4 percentage points change in the dependent variable. The marginal effects, shown in Table 3 in the previous page, that represent the total coefficients for EU and non-EU born with and without deprivation conditions are negative but not significant, somehow contrasting hypotheses H1 and H2 for which the estimates should be positive and significant. This result seems in line with Bennett and Flavin (1994) and Franklin and Franklin (2008) that find not significant effect of migratory background and race on fear of crime.

The results of this main specification seem in line with studies such as those by Vauclair and Bratanova (2017) or Brunton-Smith and Sturgis (2011) that find a negative impact on fear of crime when a deprivation, disadvantage or poverty condition is combined to being of an ethnic minority. The findings presented so far do not support hypothesis H2 discussed in subsection 4.1.1 that being foreign-born and in a condition of deprivation is associated with higher probability of self-reporting crime as an issue of the area of living as the evidence shows that rather the contrary is true. The explanation might be that conditions of deprivation are likely to be seen in areas that are themselves deprived and that often are characterised by high ethnic heterogeneity and immigrant concentration as theorised by SDT, therefore people of foreign background might not feel fearful in the context where there are many other immigrants.

The next subsection presents some specification tests to see whether the results differ based on considering different periods of time or groups of countries.

4.3 Further specifications: before the Great Recession 2004-07

Table 4 below shows the results for the specification test for the period 2004-2007. Most of the results remain unchanged compared to the main specification. As a difference, EU born is not any more significantly associated with the probability of self-reporting crime as a problem of the neighbourhood as it was instead in the main specification. On the other hand, non-EU born appeared to be negatively and significantly associated with the probability of self-reporting crime as an issue of the area of living at household level. Being a non-EU born head of household, is associated with a lower probability of perceiving crime as a problem in the neighbourhood by around 2 percentage points compared to native-born heads of household. This effect is significant at 5 percent level. This

finding is contrary to hypothesis H1 that foreign background is expected to be positively and significantly associated with the probability of self-reporting crime as an issue of the area of living.

For the interaction terms, differently from the main specification, housing deprivation is significant when interacted with non-EU born instead of EU born. Namely, for given levels of housing deprivation, non-EU born household respondents are associated with a lower probability of self-reporting crime as a problem in the area of living by around 1.3 percentage points compared to natives. The estimate is significant at 5 percent level. This result seems in line with Wu *et al*. (2017) that find a negative coefficient of foreign-born on fear of crime although in their specification the coefficient is not statistically significant. It is also partially in line with Ceccato (2018) that finds a lower fear of crime for foreign-born respondents compared to native-born respondents with foreign-born parents. However, the results presented in Table 4 and the ones by Ceccato (2018) are not directly comparable because the information on the country of birth of the parents of the household respondents is not available in this study.

Similar to the main specification, the interactions between socio-economic deprivation and the variable of interest are negative and significant, although only at 10 percent level for EU born. The results show that, for a given level of socio-economic deprivation, EU and non-EU born heads of household are respectively 0.4 and 0.7 percentage points less likely to report crime as a problem of the area of living compared to a native-born head of household. The estimate for non-EU born is highly significant (1 percent level).[28]

These findings for the interactions between the variables of interest and housing and socio-economic deprivation are in line with the findings by Brunton-Smith and Sturgis (2011) for the link between SDT and fear of crime and with Vauclair and Bratanova (2017), although in their case the approach was multilevel and interacted income inequality measured at country level with country of birth at individual level. The joint effect is negative and small in magnitude similarly to the results of the present study.

The coefficient of the interaction between monetary poverty and non-EU born is not any more significant in the specification before the Great Recession in 2008, although it is still negative. On the other hand, the interactions of inactive-unemployment and single parent with non-EU born remain negative and significant as the same as in the main specification. These findings seem to oppose hypothesis H2 that the effect of deprivation and foreign country of birth should be positive and significant.

[28] Also here, the marginal effects for country of birth have been estimated and they are not statistically significant when all the deprivation conditions are present.

The findings for single parent households and an inactive-unemployed labour status interacted with the variables of interest are in line with the evidence provided by the studies who linked the SDT with fear of crime and found that, under disadvantaged conditions, immigrants and ethnic minorities are less likely to be fearful of crime in relation to the area where they live (Brunton-Smith and Sturgis 2011; Brunton-Smith *et al*. 2013).

Interestingly, the interaction with female sex is positive and significant (5 percent level) and indicates that a non-EU born woman is associated with an around 1.6 percentage points higher probability of self-reporting crime as a problem of the area of living. This result seems to confirm hypothesis H3 and seems in line with most of the literature finding that immigrant women are more likely to fear crime (Callanan 2012; Callanan and Rosenberg 2015; Braungart *et al*. 1980).

Overall, the findings for this specification support the hypothesis H3 that immigrant women are generally more fearful of crime compared to native ones. In particular, this is true for non-EU women, while for EU women the result is not significant. Two possible explanations can be thought of here: one is that immigrants end up living in areas that are more deprived compared to the regions where they come from. Alternatively, the gender effect on crime could be more severe due to discrimination (e.g., racial discrimination) although the data do not provide enough information to test the specific origin country effect on fear of crime. The marginal effects for EU and non-EU born, shown at the bottom of Table 4 below, are negative but not significant and this is partially contrary to hypotheses H1 and H2 stated in subsection 4.1.1 above.

Consistently with the findings of the main specification, and contrary to hypothesis H2, the results show that inactivity-unemployment and single parent households interacted with country of birth are negative and significant indicating that, in a condition of deprivation, foreign-born are associated with a lower probability of self-reporting crime as a problem of the area of living in line with Brunton-Smith and Sturgis (2011) and Brunton-Smith *et al*. (2013).

These results seem to be coherent with the findings by Vauclair and Bratanova (2017) and Brunton-Smith *et al*. (2013) for which being foreigner and in a situation of deprivation or low socio-economic status is associated with lower fear of crime compared to natives.

Table 4 Specification test from 2004 to 2007 with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0280***	0.0295***
	(0.0044)	(0.0045)
Socio-economic deprivation	0.0112***	0.0117***
	(0.0011)	(0.0011)
Environmental deprivation	0.1208***	0.1200***
	(0.0042)	(0.0041)
High urbanisation	0.0785***	0.0793***
	(0.0078)	(0.0078)
Monetary poverty	-0.0040	-0.0029
	(0.0024)	(0.0024)
Single parent households	0.0165***	0.0180***
	(0.0042)	(0.0045)
EU born	-0.0080	0.0223*
	(0.0119)	(0.0108)
Non-EU born	-0.0193**	0.0165
	(0.0093)	(0.0092)
Age	0.0026***	0.0026***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.000)	(0.0000)
Female	0.0015	0.0005
	(0.0016)	(0.0015)
Lower secondary education	0.0051	0.0048
	(0.0039)	(0.0038)
Upper secondary education	0.0075*	0.0071*
	(0.0037)	(0.0037)
Higher education	0.0066	0.0063
	(0.0050)	(0.0050)
Good health	-0.0312***	-0.0312***
	(0.0035)	(0.0035)
Average health	-0.0127***	-0.0128***
	(0.0027)	(0.0027)
Disrupted marital status	-0.0021	-0.0026
	(0.0021)	(0.0023)
Inactive-unemployed	0.0017	0.0024
	(0.0024)	(0.0025)
Hous depr*EU born		0.0175
		(0.0114)
Hous depr*non-EU born		-0.0131*
		(0.0069)
Ses depr*EU born		-0.0042*
		(0.0022)
Ses depr*non-EU born		-0.0065***
		(0.0022)

Table 4 (Continue)

Env depr*EU born		0.0089
		(0.0062)
Env depr*non-EU born		0.0096
		(0.0076)
High urb*EU born		-0.0084
		(0.0092)
High urb*non-EU born		-0.0120
		(0.0081)
Mon pov*EU born		-0.0074
		(0.0080)
Mon pov*non-EU born		-0.0068
		(0.0064)
Single par*EU born		-0.0321***
		(0.0107)
Single par*non-EU born		-0.0067
		(0.0134)
Female*EU born		0.0033
		(0.0063)
Female*non-EU born		0.0158**
		(0.0070)
Disr. mar stat*EU born		0.0068
		(0.0079)
Disr. mar. stat.*non-EU born		0.0052
		(0.0064)
Inact.-unempl.*EU born		0.0070
		(0.0063)
Inact.-unempl.*non-EU born		-0.0211**
		(0.0069)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0063
		(0.0106)
Non-EU born		-0.0093
		(0.0071)
Observations	626259	626259
R-squared	0.1242	0.1245
Constant	-0.0624**	-0.0638***
	(0.0176)	(0.0179)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

4.4 Further specifications: after the Great Recession 2008-10

Table 5 below shows the results of the specification test for the period 2008-2010. In the model without interactions (column 2), the results are very similar to the one of the main models for the whole period. As the same as the main specification, the coefficient on non-EU born is negative and significant, although only at 10 percent level. It suggests that a non-EU born is less likely to report

fear of crime by around 1.5 percentage points. This seems contrary to hypothesis H1 made in subsection 4.1.1 although the significance level is low, similarly to Reid and Konrad (2004).

Among the rest of variables, the deprivation variables are positively and significantly associated to the probability of self-reporting crime as a problem in the area of living. This evidence is in line with Franklin *et al*. (2008), but not with many other studies such as Callanan (2012) and Fox *et al*. (2009).

In the model with the interaction terms (column 3), contrary to hypothesis H2 stated in section 4.1.1 for which it is expected a positive and significant effect from the interaction of deprivation conditions and country of birth on the probability of self-reporting crime as a problem of the neighbourhood, negative coefficients for the interactions between housing deprivation and EU born, high urbanisation and non-EU born, monetary poverty and non-EU born, single parent household and EU born, are presented. While the former two interactions are only significant at 10 percent level, the latter are highly significant, namely at 1 percent level. For given levels of housing deprivation, an EU born is 1.3 percentage points less likely to self-report crime as a problem of the neighbourhood compared to a native-born, while given a high degree of urbanisation (i.e., population density), being a non-EU born head of household is associated with a lower probability of self-reporting crime issues by around 1.3 percentage points compared to being native-born. For the latter interactions, a condition of monetary poverty for the household when the household head is non-EU born is associated with a lower probability of self-report crime as a problem in the neighbourhood. Namely, a non-EU born head of household is associated with 2.6 percentage points lower probability of self-reporting crime as a problem in the neighbourhood compared to a native-born, given a condition of monetary poverty. A single parent household is associated with a lower probability of self-reporting crime when the household respondent is EU born. Namely an EU born single parent that is living with children is associated with a 3.7 percentage points lower likelihood to self-report crime as a problem of the neighbourhood compared to a native-born.

These findings seem in line with evidence provided by Vauclair and Bratanova (2017) especially for the interactions with monetary poverty and with Brunton-Smith and Sturgis (2011) for the conditions of deprivation combined with country of birth, although the authors focused on the joint effect of income inequality measured at country level and ethnicity at individual level.

The interactions between marital status and non-EU born is positive and significant, differently to the main specification, and this seems to be consistent with hypothesis H2. Family disruption is one of the SDT factors, as theorised by Sampson (1987; 2008), that Brunton-Smith *et al*. (2013) find to be a relevant factor in explaining fear of crime, while race and ethnicity have also been found to be positively associated with fear of crime (Callanan 2012; Ortega and Myles 1987).

Table 5 Specification test from 2008 to 2010 with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0200***	0.0210***
	(0.0043)	(0.0044)
Socio-economic deprivation	0.0105***	0.0108***
	(0.0010)	(0.0011)
Environmental deprivation	0.1333***	0.1337***
	(0.0069)	(0.0071)
High urbanisation	0.0700***	0.0707***
	(0.0058)	(0.0058)
Monetary poverty	-0.0019	0.0003
	(0.0027)	(0.0025)
Single parent households	0.0093**	0.0099**
	(0.0042)	(0.0043)
EU born	-0.0133	0.0091
	(0.0095)	(0.0095)
Non-EU born	-0.0149*	0.0095
	(0.0085)	(0.0114)
Age	0.0021***	0.0021***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.000)	(0.0000)
Female	-0.0002	-0.0008
	(0.0017)	(0.0016)
Lower secondary education	0.0046	0.0045
	(0.0041)	(0.0041)
Upper secondary education	0.0078	0.0078
	(0.0047)	(0.0047)
Higher education	0.0063	0.0063
	(0.0052)	(0.0051)
Good health	-0.0318***	-0.0318***
	(0.0044)	(0.0044)
Average health	-0.0128***	-0.0128***
	(0.0030)	(0.0031)
Disrupted marital status	-0.0017	-0.0027
	(0.0016)	(0.0016)
Inactive-unemployed	0.0051**	0.0058**
	(0.0020)	(0.0022)
Hous depr*EU born		-0.0130*
		(0.0066)
Hous depr*non-EU born		-0.0054
		(0.0091)
Ses depr*EU born		-0.0026
		(0.0092)
Ses depr*non-EU born		0.0026
		(0.0021)

Table 5 (Continue)

Env depr*EU born		-0.0068
		(0.0069)
Env depr*non-EU born		-0.0026
		(0.0092)
High urb*EU born		0.0009
		(0.0128)
High urb*non-EU born		-0.0133*
		(0.0072)
Mon pov*EU born		-0.0059
		(0.0065)
Mon pov*non-EU born		-0.0256***
		(0.0057)
Single par*EU born		-0.0367***
		(0.0128)
Single par*non-EU born		0.0142
		(0.0133)
Female*EU born		0.0056
		(0.0077)
Female*non-EU born		0.0097
		(0.0073)
Disr. mar stat*EU born		0.0200***
		(0.0060)
Disr. mar. stat.*non-EU born		0.0080
		(0.0057)
Inact.-unempl.*EU born		-0.0056
		(0.0070)
Inact.-unempl.*non-EU born		-0.0073
		(0.0084)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0110
		(0.0079)
Non-EU born		-0.0067
		(0.0065)
Observations	600067	600067
R-squared	0.1271	0.1273
Constant	-0.0359*	-0.0372*
	(0.0197)	(0.0199)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

4.5 Further specifications: migratory background and crime perceptions in Central-Eastern European countries and the Balkans

Table 6 below presents the results for the group of Central and Eastern European countries. Interestingly, for the results without interaction terms in column 2, it is possible to see that the variables of interest are not significantly associated with the probability of self-reporting crime as a problem in the neighbourhood in Central and Eastern European countries. This is different from what happened in the main model where all the countries were included. This might be due to the smaller stock of foreign-born or foreign citizens residing in the Central-Eastern and Balkan countries in Europe compared to the Western and Nordic countries (Hooghe *et al*. 2008; Pedersen *et al*. 2008). It is in contrast to hypothesis H1 for which country of birth should have been positively and significantly associated with reporting crime as a problem of the neighbourhood.

Similar to the main specification, the interactions between socio-economic deprivation and EU born is negative and highly significant (1 percent level). Namely, for a given level of socio-economic deprivation, an EU born is associated with a 0.7 percentage points lower probability of self-reporting crime as an issue of the area of living. This seems contrary to hypothesis H2 that stated a positive and significant combined effect of material deprivation and country of birth as predicted by the SDT (Markowitz *et al*. 2001; Sampson 1987) and those studies predicting a positive impact of race/migratory background or ethnicity on fear of crime (Callanan 2012; Lane and Meeker 2004 that interacted social disorganization and race).

Interestingly, the interaction terms between monetary poverty and EU and non-EU born respectively return opposite results. EU born heads of households that are living in a condition of monetary poverty, are associated with an around 3.3 percentage points higher likelihood to report crime as a problem of the area of living compared to natives. On the contrary, non-EU born in a similar condition are associated with an around 2.4 lower probability of self-reporting crime as a problem of the neighbourhood compared to natives. These results are at the same time in contrast and consistent to hypothesis H2 stated in subsection 4.1.1 respectively for non-EU and EU born compared to natives. They seem to signal that non-EU born, mostly coming from low or lower-middle income countries (OECD 2020), are associated with lower probability of reporting crime as a problem of the neighbourhood when finding themselves in a condition of monetary poverty. This is probably because conditions of monetary poverty are more present in neighbourhoods characterised by ethnic heterogeneity and social disorganisation, as predicted by the SDT (Markowitz *et al*. 2001). These are the areas where migrants tend to cluster, and, consistently with the findings by Brunton-Smith and Sturgis (2011), the perceptions among these ethnic groups is less negative compared to natives because of the intra-ethnic social cohesion and economic support that migrants can find in these

neighbourhoods and it can be argued that these migrants might live in conditions of more severe deprivation and higher crime in the origin countries and thus they feel relatively safer in the host countries in spite of the condition of monetary poverty that the household face.

For EU born and monetary poverty, the results are consistent with hypothesis H2. This might signal that EU born that are coming from better off countries, especially considering that this specification takes into account the poorer group of countries in Europe, are feeling less secure given a condition of monetary poverty. They might be used to live in safer neighbourhoods in their home countries while they have to face poorer conditions in the host country and reside in neighbourhoods that they perceive more insecure where crime could be considered as a problem. It might also be that these migrants are coming from EU countries that are not better off (e.g., Romanian-born heads of household that live in Czech Republic), and that while in the home country, for a given wage, they could live in safer areas, they have to resort to live in areas that are perceived more unsafe in the host country because of higher living costs.

Similar to all previous specifications, the interaction between single parent household and EU born is negative and significant. Namely an EU born household head is associated with an around 5.8 percentage points lower probability of self-reporting crime as a problem in the area of living. The coefficient is significant at 1 percent level. This provides evidence against hypothesis H2 that a migrant, living in a condition of concentrated disadvantage, is significantly associated with a higher likelihood to report crime as a problem in the area of living. It seems in line with Brunton-Smith *et al*. (2013) for which a migrant who lives in a condition of deprivation is less likely to report fear of crime compared to a native.

On the contrary, a single parent household head that is born outside the EU is positively and significantly associated with reporting crime as a problem of the area of living by around 6.3 percentage points compared to a native. The estimate is sizeable and highly significant (1 percent level). This result is consistent with hypothesis H2 for which, in a condition of disadvantage, a foreign-born is more likely to report crime as a problem of the neighbourhood. It might be that non-EU born heads of household feel more discriminated compared to EU born and they are less integrated as found by Valentová and Alieva (2018), and thus, in a condition of disadvantage, they feel lack of support and are more likely to perceive crime as a problem of the areas where they live. This seems in line with Lane and Meeker (2004) that found a positive joint effect of race at individual level and social deprivation on fear of crime.[29]

[29] Specifically, the authors focus on fear of gang crime in the US.

Table 6 Specification test for Central-Eastern European and Balkan countries with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0165**	0.0159**
	(0.0063)	(0.0063)
Socio-economic deprivation	0.0073***	0.0074***
	(0.0006)	(0.0007)
Environmental deprivation	0.1450***	0.1447***
	(0.0134)	(0.0135)
High urbanisation	0.0695***	0.0708***
	(0.0075)	(0.0065)
Monetary poverty	-0.0010	0.0002
	(0.0036)	(0.0029)
Single parent households	0.0096	0.0071
	(0.0060)	(0.0065)
EU born	-0.0040	0.0107
	(0.0055)	(0.0123)
Non-EU born	0.0154	0.0083
	(0.0192)	(0.0095)
Age	0.0006	0.0006
	(0.0005)	(0.0005)
Age squared	-0.0000*	-0.0000*
	(0.000)	(0.0000)
Female	0.0029	0.0024
	(0.0035)	(0.0033)
Lower secondary education	-0.0121	-0.0119
	(0.0066)	(0.0066)
Upper secondary education	-0.0032	-0.0029
	(0.0050)	(0.0050)
Higher education	0.0026	0.0029
	(0.0047)	(0.0048)
Good health	-0.0235***	-0.0235***
	(0.0055)	(0.0055)
Average health	-0.0073*	-0.0075**
	(0.0033)	(0.0032)
Disrupted marital status	-0.0004	-0.0000
	(0.0023)	(0.0022)
Inactive-unemployed	-0.0048*	-0.0044
	(0.0025)	(0.0027)
Hous depr*EU born		0.0015
		(0.0085)
Hous depr*non-EU born		0.0157
		(0.0114)
Ses depr*EU born		-0.0073***
		(0.0014)
Ses depr*non-EU born		-0.0018
		(0.0017)

Table 6 (Continue)

Env depr*EU born		0.0099
		(0.0152)
Env depr*non-EU born		-0.0064
		(0.0083)
High urb*EU born		-0.0019
		(0.0191)
High urb*non-EU born		-0.0057
		(0.0139)
Mon pov*EU born		0.0328***
		(0.0090)
Mon pov*non-EU born		-0.0238***
		(0.0072)
Single par*EU born		-0.0584***
		(0.0176)
Single par*non-EU born		0.0626***
		(0.0181)
Female*EU born		-0.0075
		(0.0093)
Female*non-EU born		0.0047
		(0.0065)
Disr. mar stat*EU born		0.0165
		(0.0090)
Disr. mar. stat.*non-EU born		-0.0084
		(0.0068)
Inact.-unempl.*EU born		-0.0220
		(0.0281)
Inact.-unempl.*non-EU born		-0.0254
		(0.0160)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0066
		(0.0046)
Non-EU born		0.0192
		(0.0121)
Observations	360026	360026
R-squared	0.1561	0.1566
Constant	0.1516***	0.1494***
	(0.0267)	(0.0269)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

Overall, the results seem to suggest mixed findings compared to the main hypotheses that needed to be tested. However, if anything, the findings presented in this subsection seem to be partially in line with hypothesis H2 but point in the direction of rejecting H1 and H3 as no significant effects have been found for country of birth by itself and the interaction between female gender and foreign-born.

4.6 Further specifications: migratory background and crime perceptions in Western, Mediterranean and Nordic countries in Europe

Table 7 below presents the results for migratory background and crime perceptions in the Western, Mediterranean and Nordic countries in Europe. For the variables of interest, similar to the main specification, it is possible to see that non-EU born household heads are associated with an around 3 percentage points lower probability of self-reporting crime as a problem of the area of living. This result contradicts the hypothesis H1 for which an individual with foreign background is associated with higher probability of perceiving crime as a problem of the area of living or fear of crime (Fox *et al*. 2009; Callanan 2012).

On the other hand, the deprivation conditions are positively and significantly associated with the probability of self-reporting crime as a problem of the area of living. The same holds for other variables such as a high degree of urbanisation, single parent households, educational attainments, health status and inactive or unemployed labour status in line with SDT predictions and other studies (Sampson *et al*. 1997; Brunton-Smith *et al*. 2013; Scarborough *et al*. 2010).

Interestingly, it is noticed that being an EU born with no deprivation condition is positively and significantly associated with the probability of self-reporting crime as a problem of the area of living by around 2 percentage points compared to a native-born. The coefficient is significant at 5 percent level. This result is consistent with hypothesis H1 that being foreign-born is associated with a higher probability of reporting crime as a problem of the area of living and is in line with the evidence of many previous studies (Callanan 2012; Callanan and Rosenberg 2015). The reason here might be related to the degree of discrimination that these migrants have to face in the host countries and, although they face no material or social deprivation, they might still end up living in areas that are deprived and characterised by crime rates and, thus, be more likely to self-report crime as an issue of the area of living.

On the contrary, the marginal effect of non-EU born that is the sum of the coefficients with and without deprivation and disadvantage is negative and highly significant (1 percent level). Namely, a non-EU born head of household is on average associated with an around 1.6 percentage points lower likelihood to self-report crime as a problem of the area of living. This is contrary to hypotheses H1 and H2 and seem in line with the studies finding a negative effect of combining deprivation or disadvantage with a foreign background (Vauclair and Bratanova 2017; Brunton-Smith *et al*. 2013).

For the interaction terms of this specification, housing deprivation combined with EU born is significantly associated with an around 2 percentage points lower probability of self-reporting crime as an issue in the neighbourhood compared to natives and the estimate is significant at 5 percent level.

Similarly, socio-economic deprivation combined with EU and non-EU born is also negatively and significantly associated with the probability of self-reporting crime as an issue of the neighbourhood respectively by around 0.5 and 0.9 percentage points compared to natives. Both the estimates are significant at 5 percent level. The results for both the interactions with socio-economic and housing deprivation are contrary to hypothesis H2 and seem in line with the findings of Brunton-Smith and Sturgis (2011) for which foreign-born are less likely to report fear of crime compared to natives given a situation of deprivation of neighbourhoods they live in.

Similar to all the previous specifications, an EU born who is a single parent with children is significantly associated with an around 3.1 percentage points lower probability of self-reporting crime as a problem of the area of living. The coefficient is significant at 5 percent level. This finding is contrary to hypothesis H2, stated in subsection 4.1.1 above, that a foreign-born in a condition of concentrated disadvantage (i.e., single parent or with a disrupted marital status) should be more likely to self-report crime as an issue of the neighbourhood. The result seems in line with the evidence provided by Brunton-Smith and Sturgis (2011) that race and ethnic background moderate the impact of concentrated disadvantage on fear of crime.

The interaction between a disrupted marital status and EU born is positive and significant at 5 percent level and shows that, given a disrupted marital status, an EU born is associated with a 1.4 percentage points higher likelihood to self-report crime as an issue of the area of living compared to a native-born. This result seems consistent with hypothesis H2 that, given a condition of deprivation or disadvantage, a foreign-born should be associated with a higher probability of self-report crime as a problem of the area of living. It is also in line with the literature finding a positive impact of family disruption on social disorganisation and, through this, on fear of crime (Sampson *et al*. 1997; Brunton-Smith *et al*. 2013), and with the studies finding that a condition of deprivation or disadvantage combined with a foreign background has the effect of increasing fear of crime (Lane and Meeker 2004). The explanation might be that an EU born that is divorced, widowed, or separated might not have enough social support in the host country and might have to live in deprived areas where rent costs are lower given that she or he lives with only one source of income and, in case of divorce, might have to pay a compensation to the former partner. Given this circumstance, the probability of living in an area where crime is perceived as a problem would be higher.

Table 7 Specification test for Western European countries with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0271***	0.0291***
	(0.0051)	(0.0051)
Socio-economic deprivation	0.0133***	0.0142***
	(0.0011)	(0.0012)
Environmental deprivation	0.1182***	0.1175***
	(0.0036)	(0.0036)
High urbanisation	0.0756***	0.0763***
	(0.0082)	(0.0082)
Monetary poverty	-0.0039	-0.0023
	(0.0028)	(0.0028)
Single parent households	0.0126***	0.0144***
	(0.0036)	(0.0039)
EU born	-0.0124	0.0203**
	(0.0114)	(0.0087)
Non-EU born	-0.0284***	0.0168
	(0.0073)	(0.0107)
Age	0.0030***	0.0031***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.000)	(0.0000)
Female	-0.0005	-0.0012
	(0.0015)	(0.0015)
Lower secondary education	0.0120***	0.0117***
	(0.0040)	(0.0039)
Upper secondary education	0.0145***	0.0142***
	(0.0044)	(0.0043)
Higher education	0.0106*	0.0102*
	(0.0058)	(0.0057)
Good health	-0.0374***	-0.0373***
	(0.0038)	(0.0039)
Average health	-0.0172***	-0.0172***
	(0.0024)	(0.0023)
Disrupted marital status	-0.0027	-0.0034
	(0.0022)	(0.0024)
Inactive-unemployed	0.0060**	0.0061**
	(0.0024)	(0.0027)
Hous depr*EU born		-0.0198**
		(0.0086)
Hous depr*non-EU born		-0.0134
		(0.0086)
Ses depr*EU born		-0.0052**
		(0.0022)
Ses depr*non-EU born		-0.0092***
		(0.0017)

Table 7 (Continue)

Env depr*EU born		0.0073
		(0.0055)
Env depr*non-EU born		0.0063
		(0.0071)
High urb*EU born		-0.0039
		(0.0108)
High urb*non-EU born		-0.0097
		(0.0059)
Mon pov*EU born		-0.0077
		(0.0046)
Mon pov*non-EU born		-0.0091*
		(0.0047)
Single par*EU born		-0.0314***
		(0.0101)
Single par*non-EU born		-0.0024
		(0.0095)
Female*EU born		-0.0061
		(0.0065)
Female*non-EU born		0.0051
		(0.0047)
Disr. mar stat*EU born		0.0142**
		(0.0065)
Disr. mar. stat.*non-EU born		0.0038
		(0.0047)
Inact.-unempl.*EU born		0.0007
		(0.0061)
Inact.-unempl.*non-EU born		-0.0068
		(0.0065)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0096
		(0.0101)
Non-EU born		-0.0159***
		(0.0047)
Observations	866278	866278
R-squared	0.1141	0.1144
Constant	-0.0737***	-0.0770**
	(0.0173)	(0.0173)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

Although the findings for the last two interactions (i.e., single parent and disrupted marital status separately interacted with EU born) seem to contradict each other, it is plausible for them to be different from each other. Namely, a single parent with children household is likely to receive benefits on top of the household income, and this might provide a support to avoid being caught in a poverty trap that might increase the probability of living in an area where crime could be perceived as a

problem.[30] Moreover, a single parent with children that is EU born might receive social support from the neighbourhood also thanks to the network that is built with other families in the neighbourhood. On the other hand, a person with a disrupted marital status might not receive income support especially if from a foreign background or ethnic minority (see Harrington Meyer *et al*. 2005 for the link between benefits and marital status for women) and might be more likely to suffer from physical and psychological disorders (Shapiro and Keyes 2008). This, in turn, may lead to a more negative perception of the safety of the neighbourhood (Foster *et al*. 2016).Overall, the results for the Western, Mediterranean and Nordic countries in Europe are similar to the one for the main specification with all countries over the whole period. Most of the findings do not support the hypotheses H1, H2 and H3 that have been made in the beginning of this study, except for the positive and significant interaction between a disrupted marital status and an EU born household head. On the other hand, a negative and significant impact has been found for the interaction term between EU born and single parent household contrary to hypothesis H2, and this is consistent throughout all previous specifications. Other results seem not robust and context dependent.

5. Concluding remarks

In this study, the link between migratory background, proxied by country of birth, and the probability of self-reporting crime, violence or vandalism as a problem of the area of living has been assessed for various European countries across a period of time of 6 years, namely from 2004 to 2010. In the general model, it has been shown that being born in a non-EU country is associated with a lower probability of self-reporting crime as an issue in the area of living. This is in contrast with many previous studies that find a positive impact between race and migratory background and fear of crime (Fox *et al*. 2009; Callanan 2012) and seem partially in line with other studies that documented a generally lower fear of crime among foreign-born (Franklin *et al*. 2008). However, this result is only significant at 10 percent level and does not appear to hold through various specifications signalling that the link between country of birth and crime perceptions is very context-dependent and cannot be easily generalised.

Other factors included in the analysis have been borrowed from the SDT, namely socio-economic, housing and environmental deprivation as well as urbanisation and population density, monetary poverty and single parent households. The SDT is used to predict crime rates, but it has been found to be useful in predicting also fear of crime or crime perceptions (Brunton-Smith *et al*. 2013; Brunton-

[30] See Bradshaw *et al*. (2018) and Morissens (2018) for the link between universal benefits and poverty risk for single parent households.

Smith and Sturgis 2011). Other personal variables such as sex, age, educational attainment, self-reported health status, marital status and labour status have also been included following what was done in most of previous papers (Ortega and Myles 1987; Scarborough *et al*. 2010).

Given that both these variables and the variables of interest have been found to be important predictor of crimes and their link with crime perceptions is intertwined as argued by Brunton-Smith and Sturgis (2011) and found by Ortega and Myles (1987), specifically for the interactions between sex, age and race, interaction terms between these variables and the variables of interest have been included in the analysis. In the main specification, the interactions between housing deprivation and socio-economic deprivation respectively with EU born and both EU and non-EU born indicate that, for given levels of deprivation, EU and non-EU born are less likely to report crime as an issue of the area of living. This result seem in line with the findings by Vauclair and Bratanova (2017) who found a negative joint effect between income inequality and migratory background in their multilevel analysis and by Brunton-Sturgis (2011) who found that, in line with the SDT, migratory background and race are associated with lower fear of crime especially in those areas classically defined as deprived, that is, those areas having high levels of immigrant concentration and ethnic diversity, residential mobility and low socio-economic background. In addition, the interaction term of female sex and foreign-born indicates a significant association with higher levels of fear of crime and this seems in line with the findings by Callanan and Rosenberg (2015) but opposed to that of other studies such as Ortega and Myles (1987). However, none of the interaction terms are significant across all the specifications, at the most 4 out of 5 specifications.

On the other hand, the negative link between single parent household and EU born household head has been found to be consistent across all the specifications although the magnitude of the estimate of the interaction is not the same. On average, the interaction signals that a single parent household who is born in an EU country, different from the country of residence, is associated with an around 3.5 percentage points lower probability of self-reporting crime as a problem of the area of living. This seems in line with those studies finding a higher support for individuals with a foreign background in areas where there is clustering of immigrants that do not experience necessarily higher crime rates and fear of crime (Hipp and Yates 2011; Brunton-Smith and Sturgis 2011; Lee and Martinez 2009). Moreover, single parent households headed by a non-native EU born in a European country might be eligible to receive welfare benefits from the government (Bradshaw *et al*. 2018) and might be more likely to receive social support in the area of living. Both these factors can lead to diminishing fear of crime. It might also be related to the levels of crime experienced by these single parents in their home countries which could be expected to be higher than those in the countries of residence.

Overall, the results presented in this study show that the link between country of birth and crime perceptions is very much context and time dependent. While several studies found positive effects of migratory background and/or race on fear of crime (Fox *et al*. 2009: Callanan 2012), the evidence provided here is inconclusive and, if anything, points toward the opposite direction by indicating that foreign-born or citizens are less likely to perceive higher fear of crime especially when exposed to deprivation conditions compared to native-born or citizens.

In terms of policy implications, this study shows that migratory background itself is not a significant predictor of crime perceptions, thus, no particular effort based on country of birth or citizenship, such as tougher migration policies, should be taken in order to tackle fear of crime. On the other hand, the deprivation levels of the area where the heads of the households live matter for determining a higher probability of self-reporting crime as a problem of the area of living and this result is robust across all the specifications. Furthermore, combined with the country of birth, deprivation seems to be associated with higher probability of self-reporting crime as a problem of the neighbourhood if the head of the household is native-born, while this is not true or rather the opposite if the respondent is foreign-born. This indicates that policymakers should rather focusing on fighting deprivation and pursue policies that facilitate integration for migrants rather than reducing migratory flows or make it more difficult to apply for visas or residence permits.

Further research would need to be done to understand the specific impact of the country of origin, not only EU and non-EU, and following the same households through time in a panel data setting. If information on single geographic country of birth is available, it would be interesting to check whether being born in a certain area of the world is associated to higher crime perceptions. Moreover, data at neighbourhood level on crime rates, location and other variables (social ties, neighbourhood cohesion, disadvantage) would be very useful in this setting as it would allow a researcher to link SDT elements with actual crime rates and crime perceptions and the levels of ethnic diversity or immigrant concentration to explore whether differences in crime perceptions by country of birth depends on the specific characteristics of the neighbourhood.

Appendix A: Descriptive statistics and correlation matrix

Table A.8 Comprehensive list of all variables used in the empirical analysis

Variables (all measured at province-level)	Source	Unit of measurement
Crime perception It is a dummy variable taking value 1 if the household perceives that crime, violence or vandalism are a problem of the area of living with no standard definition of what a problem is (EU-SILC Documentation, 2006).	EU-SILC microdata household file	Binary variable (0,1)
Country of birth There are 3 dummy variables for country of birth: 1) EU born. The variable takes value 1 if the individual is EU born, but not in the country of residence, and 0 otherwise. 2) Native-born. The variable takes value 1 if the individual is born is the country where she or he resides in, and 0 otherwise. 3) Non-EU born. The variable takes value 1 if the individual is born in a non-EU country, but not the country of residence, and 0 otherwise.	EU-SILC microdata personal file	Binary variable (0,1)
Housing deprivation index The housing deprivation index is the sum of three dummy variables referring to housing condition: the presence of leaking roof, the tenure status namely if the individual is a private tenant or pays a rent lower than the market value and the type of dwelling namely if the household head lives in a flat or apartment situated in a building with more than 10 dwellings (EU-SILC Documentation, 2006). The maximum value of this index is 3 if all the conditions of deprivation are present and 0 if, instead, no deprivation is present.	EU-SILC microdata household file	Number from 0 (no deprivation) to 3 (maximum deprivation)
Socio-economic deprivation index The socio-economic deprivation index is constructed by summing up dummy variables referring to various conditions of socio-economic exclusion. Specifically, there are a dummy variable taking value 1 if the housing cost is considered a heavy burden for the household and 0 otherwise, a variable that takes value 1 if the household has some difficulty, difficulty or great difficulty to make ends meet and 0 otherwise, and other four variables taking value 1 if the household cannot afford respectively a computer, a washing machine, a television or a telephone. Other binary variables, used to build the socio-economic deprivation index, have value 1 if the household cannot face unexpected financial expenditures, cannot pay for a holiday abroad or cannot afford a protein prevalent meal (meat, fish or vegetarian equivalent). The maximum value of the indicator is equal to the maximum number of variables included, thus 9 in the case of the socio-economic deprivation index and 0 the lowest value if no deprivation condition is in place.	EU-SILC microdata household file	Number from 0 (no deprivation) to 9 (maximum deprivation)

Table A.8 Continue

Environmental deprivation index The environmental deprivation index puts together elements of social deprivation and exclusion and environmental decay. It results as the sum of the three binary variables taking value 1 in case the household lives in a socio-ecological condition of deprivation. These variables refer to living in a dwelling that is too dark (the rooms do not have enough light, but no common standards are indicated on how to assess this), perceiving noise in the neighbourhood as a problem and the presence of pollution, grime or other environmental issues. By including the self-reported problem of noises from neighbours, the socio-ecological deprivation index takes partially into account the social ties and the friendship networks within the neighbourhood as theorised by Sampson *et al*. (1997) in the SDT model with social capital and collective efficacy. The variable on self-reported problem of noises from neighbours is used a proxy for social ties within a neighbourhood (i.e., a household would not report noise from neighbours being a problem if the social ties are strong within the neighbourhood). It is a simplification, but it appears plausible given that noise or nuisance are considered as anti-social behaviours in a neighbourhood (Age UK, Report February 2020).	EU-SILC microdata household file	Number from 0 (no deprivation) to 3 (maximum deprivation)
Urbanisation and population density Urbanisation and population density are captured through the variable on degree of urbanisation which takes value 1 if the area has a population density higher than 500 inhabitants per square kilometre and the total population of the area is higher than 50,000 inhabitants (EU-SILC Documentation, 2006).	EU-SILC microdata household file	Binary variable (0,1)
Monetary poverty The variable takes value 1 if the equivalised disposable income, that is given by the total disposable household income times the within household non-response inflation and divided by the equivalised household size, is lower than the "at risk of poverty threshold" equal to 60% of the median household income deriving from interest, dividends and profit from capital investments in unincorporated business (EU-SILC Documentation, 2006) and 0 otherwise.	EU-SILC microdata household file	Binary variable (0,1)
Single parent household The variable takes value 1 if the household is a single parent household with one or more dependent children, and 0 otherwise.	EU-SILC microdata household file	Binary variable (0,1)
Age The variable is equal to the age of the respondent at the date of the interview. It is calculated by subtracting date of birth (in year and month) from date of interview (in year and month). It may vary from one digit compared to real age at the exact day of interview, as the day of birth is not known (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Number representing the age in years
Sex The variable is equal to 1 if the household respondent is female and 0 otherwise, so the omitted category is male.	EU-SILC microdata personal file	Binary variable (0,1)
Lower secondary education The variable takes value 1 if the highest educational attainment reached by the household respondent is a lower secondary education degree and 0 otherwise. For defining a lower secondary education level, the ISCED 97 classification (ISCED 97) has been used.	EU-SILC microdata personal file	Binary variable (0,1)
Upper secondary education The variable takes value 1 if the highest educational attainment reached by the household respondent is an upper secondary education degree and 0 otherwise. For defining a upper secondary education level, it has been used the ISCED 97 classification (ISCED 97).	EU-SILC microdata personal file	Binary variable (0,1)

Table A.8 (Continue)

Variables (all measured at province-level)		Unit of measurement
Higher education The variable takes value 1 if the highest educational attainment reached by the household respondent is a tertiary education degree and 0 otherwise. For defining a tertiary education level, it has been used the ISCED 97 classification (ISCED 97).	EU-SILC microdata personal file	Binary variable (0,1)
Good health status The variable takes value 1 if the self-perceived health status by the household respondent is a "very good" or "good" health status and 0 otherwise. The measurement of self-perceived health (SPH) is, by its very nature, subjective. The notion is restricted to an assessment coming from the individual and not from anyone outside that individual, whether an interviewer, health care worker or relative (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Binary variable (0,1)
Average health status The variable takes value 1 if the self-perceived health status by the household respondent is an "average (not good nor bad)" health status and 0 otherwise. The measurement of self-perceived health (SPH) is, by its very nature, subjective. The notion is restricted to an assessment coming from the individual and not from anyone outside that individual, whether an interviewer, health care worker or relative (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Binary variable (0,1)
Disrupted marital status The variable takes value 1 if the household respondent is either separated, widowed or divorced and 0 otherwise.	EU-SILC microdata personal file	Binary variable (0,1)
Inactive-unemployed status The variable takes value 1 if the household respondent is either "unemployed" or "inactive" as for her/his activity status and 0 otherwise. Inactive does not include people that are retired or in early retirement, but it includes people who are in military service (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Binary variable (0,1)
Household type Various dummies for the household type taking value 1 for each one of the following conditions and 0 otherwise (in total 7 dummies excluding the single parent household described above and the omitted category): 1) 2 adults, no dependent children, both adults under 65 years. 2) 2 adults, no dependent children, at least one adult 65 years or more. 3) Other households without dependent children. 4) 2 adults, one dependent child. 5) 2 adults, two dependent children. 6) 2 adults, three or more dependent children. 7) Other households with dependent children. The omitted category is "One person household" without dependent people (EU-SILC Documentation, 2006).	EU-SILC microdata household file	Binary variable (0,1)

References

Abdullah, A., Hedayati Marzbali, M., Woolley, H., Bahauddin, A. and Maliki, N. Z. (2014). Testing for individual factors for the fear of crime using a multiple indicator-multiple cause model. *European Journal on Criminal Policy and Research*, 20(1), 1-22, doi: 10.1007/s10610-013-9208-4.

Age UK Report (2020). *Anti-social behaviour in housing*. Factsheet 9.

Alda, E., Bennett, R. R. and Morabito, M. S. (2017). Confidence in the police and fear of crime in the developing world. *Policing: An International Journal*, 40, 366–379.

Alper, M. and Chappell, A. (2012). Untangling Fear of Crime: A Multi-theoretical Approach to Examining the Causes of Crime-Specific Fear. *Sociological Spectrum*, 32(4), 346–63.

Andreescu, V. (2013). Fear of Violent Victimization among Foreign-Born. *Journal of Identity and Migration Studies*, 7(1), 69–93.

Barton, M. S., Weil, F., Jackson, M. and Hickey, D. A. (2017). An investigation of the influence of the spatial distribution of neighbourhood violent crime on fear of crime. *Crime and Delinquency*, 63, 1757–1776. doi:10.1177/0011128716671874.

Bennett, R. R. and Flavin, J. M. (1994). Determinants of fear of crime: The effect of cultural setting. *Justice Quarterly*, 11, 357–381.

Boateng, F. D. and Adjekum-Boateng, N. S. (2017). Differential perceptions of fear of crime among college students: The race factor. *Journal of Ethnicity in Criminal Justice*, 15, 138–159. doi:10. 1080/15377938.2017.1310683.

Borjas, G. J. and Bronars, S. G. (1991), Immigration and the family, *Journal of Labor Economics*, 9 (2), 123–148.

Box, S., Hale, C. and Andrews, G. (1988). Explaining fear of crime. *British Journal of Criminology*, 28, 340–356.

Bradshaw, J., Keung, A. and Chzhen, Y. (2018). Cash Benefits and Poverty in Single-Parent Families. in R. Nieuwenhuis and L. Maldonado (eds) *The Triple Bind of Single-parent Families: Resources, Employment and Policies to Improve Well-Being*, 337-357. Bristol: Policy Press.

Braungart, M. M., Braungart, R. G. and Hoyer, W. J. (1980). Age, Sex, and Social Factors in Fear of Crime. *Sociological Focus*, 13, 55–56.

Bruinsma, G. J. N., Pauwels, L. J. R., Weerman, F. M. and Bernasco, W. (2013). Social Disorganization, Social Capital, Collective Efficacy and the Spatial Distribution of Crime and Offenders: An Empirical Test of Six Neighbourhood Models for a Dutch city. *British Journal of Criminology*, 53, 942–63.

Bruner, C. (2017). ACE, place, race and poverty: building hope for children. *Academic Pediatrics*, 17, 123–9.

Brunton-Smith, I. and Sturgis, P. (2011). Do neighborhoods generate fear of crime? An empirical test using the British crime survey. *Criminology*, 49, 331–369.

Brunton-Smith, I., Sutherland, A. and Jackson, J. (2013). The role of neighbourhoods in shaping crime and perceptions of crime. In D Manley, M van Ham, N Bailey, L Simpson & D Maclennan (eds), *Neighbourhood effects or neighbourhood based problems?* Springer, Dordrecht.

Bug, B. M., Kroh, M. and Meier, K. (2015). Regional crime rates and fear of crime: WISIND findings. *DIW Economic Bulletin*, 5(12), 167–176.

Bursik R. J. (1988), Social Disorganization and Theories of Crime and Delinquency: Problems and Prospects, *Criminology*, 26, 519–52.

Bushway, S., Cook, P. J. and Phillips, M. (2012). The overall effect of the business cycle on crime. *German Economic Review*, 13, 436–46.

Callanan, V. J. (2012). Media consumption, perceptions of crime risk and fear of crime: examining race/ethnic differences. *Sociological Perspectives*, 55, 93–115.

Callanan, V. and Rosenberger, J. S. (2015). Media, gender, and fear of crime. *Criminal Justice Review*, 40(3), 322–339. doi:10.1177/0734016815573308.

Carter III, G. R. (2011). From Exclusion to Destitution: Race, Affordable Housing, and Homelessness. *Cityscape: A Journal of Policy Development and Research*, 13(1), 33–70.

Ceccato, V. (2018). Fear of crime and overall anxieties in rural areas: The case of Sweden. In G. M. Murray Lee (Ed.), *The Routledge International Handbook on Fear of Crime* (1 ed.). Routledge. http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-233897.

Chandola, T. (2001). The fear of crime and area differences in health. *Health and Place*, 7, 105–116.

Chiricos, T., Eschholz, S. and Gertz, M. (1997). Crime, news and fear of crime: Toward an identification of audience effects. *Social Problems*, 44, 342–357

Chiswick, B. R. and DebBurman, N. (2004). Educational Attainment: Analysis by Immigrant Generation. *Economics of Education Review*, 23, 361–79.

Cho, W. and Ho, A. T. (2018). Does neighbourhood crime matter? A multi-year survey study on perceptions of race, victimization and public safety. *International Journal of Law, Crime and Justice*, 55, 13–26.

Clark, K., Garratt, L., Li, Y., Lymperopoulou, K. and Shankley, W. (2019). Local Deprivation and the Labour Market Integration of New Migrants to England. *Journal of Ethnic and Migration Studies*. doi:10.1080/1369183X.2018.1481000.

Clemente, F. and Kleiman, M. (1977). Fear of crime in the United States: A multivariate analysis. *Social Forces*, 56, 519–531.

Coleman, D. A. (1992). Does Europe need immigrants: Population and work force projections. *International Migration Review*, 26(2), 413–461.

Cops, D. and Pleysier, S. (2011). 'Doing gender' in fear of crime. *British Journal of Criminology* 51(1), 58–74.

Cossman, J. S. and Rader, N. E. (2011). Fear of crime and personal vulnerability: Examining self-reported health. *Sociological Spectrum*, 31(2), 141–162.

Dowler, K. (2003). Media consumption and public attitudes toward crime and justice: The relationship between fear of crime, punitive attitudes, and perceived police effectiveness. *Journal of Criminal Justice and Popular Culture*, 10, 109–26.

European Central Bank – Eurosystem (2007). *Bulgaria and Romania join the European Union*. https://www.ecb.europa.eu/press/pr/date/2007/html/pr070102_1.en.html [Accessed on 19th June 2021].

European Survey on Income and Living Conditions (EU-SILC). *Metadata and variables description*. Version 2006. Eurostat Microdata, restricted access.

Eurostat Microdata (2016), EU-SILC database microdata for research. European Commission.

Fellini, I. and Guetto, R. (2020). Legal status and immigrants' labour market outcomes: Comparative evidence from a quasi-experiment in Western and Southern Europe. *Journal of Ethnic and Migration Studies*, 1–22. https://doi.org/10.1080/1369183X.2020.1752639.

Fitzgerald, T., Lea, S., Brinkley, J. and Zervos, E. E. (2014). Colorectal cancer outcome inequalities: association between population density, race, and socioeconomic status. *Rural and Remote Health*, 14, 2668. https://doi.org/10.22605/RRH2668.

Foster, S., Hooper, P., Knuiman, M. and Giles-Corti, B. (2016). Does heightened fear of crime lead to poorer mental health in new suburbs, or vice versa? *Social Science and Medicine*, 168, 30–34.

Fox, K. A., Nobles, M. R. and Piquero, A. R. (2009). Gender, crime victimization and fear of crime. *Security Journal*, 22, 24–39.

Franklin, C. A. and Franklin, T. W. (2009). Predicting Fear of Crime Considering Differences Across Gender. *Feminist Criminology*, 4(1), 83–106.

Franklin, T. W., Franklin, C. A. and Fearn, N. E. (2008). A multilevel analysis of the vulnerability, disorder, and social integration models of fear of crime. *Social Justice Research*, 21, 204–227.

Gainey, R., Alper, M. and Chappell, A. T. (2011). Fear of Crime Revisited: Examining the Direct and Indirect Effects of Disorder, Risk Perception, and Social Capital. *American Journal of Criminal Justice*, 36(2), 120–37.

Gebremedhin, T. A. and Mavisakalyan, A. (2013). Immigration and political instability. *Kyklos*, 66(3), 317–341.

Gilman, A. B., Hill, K. G., Kim, B. E., Nevell, A., Hawkins, J. D. and Farrington, D. P. (2014). Understanding the relationship between self‐reported offending and official criminal charges across early adulthood. *Criminal behaviour and mental health*, 24(4), 229-240.

Harrington Meyer, M., Wolf, D. A. and Himes, C. L. (2005). Linking benefits to marital status: Race and social security in the US. *Feminist Economics*, 11, 145–162.

Hipp, J. R. (2010). Micro-structure in micro-neighbourhoods: A new social distance measure, and its effect on individual and aggregated perceptions of crime and disorder. *Social Networks*, 32, 148–59.

Hipp, J. and Yates, D. (2011). Ghettos, thresholds, and crime. *Criminology*, 49, 955–990.

Hogan, D. P. and Eggebeen, D. J. (1999). Demographic change and the population of children: Race/ethnicity, immigration, and family size. In Hauser, R.M., Brown, B.V. & Prosser, W.R. *Indicators of children's well-being*, 311–327. New York: Russell Sage Foundation.

Holmes, M. D. (2003). Ethnicity, concentrated minority disadvantage, and perceived risk of victimization. *Journal of Ethnicity and Criminal Justice*, 1(3-4), 1-20.

Hooghe, M., Trappers, A., Meuleman, B. and Reeskens, T. (2008). Migration to European countries. A structural explanation of patterns, 1980-2004. *International Migration Review*, 42, 476-504.

Houts, S. and Kassab, C. (1997). Rotter's social learning theory and fear of crime: Differences by race and ethnicity. *Social Science Quarterly*, 78, 122–136.

Huizinga, D. and Elliott, D.S. (1986). Reassessing the reliability and validity of self-report delinquency measures. *Journal of quantitative criminology*, *2*(4), 293–327.

Hummelsheim, D., Hirtenehner, H., Jackson, J. and Oberwittler, D. (2011). Social insecurities and fear of crime: A cross-national study on the impact of welfare state policies on crime-related anxieties. *European Sociological Review*, 27, 327–345.

Iacovou, M., Kaminska, O. and Levy, H. (2012). *Using EU-SILC data for cross-national analysis: strengths, problems, and recommendations*. ISER Working Paper No. 2012-03.

International Standard Classification of Education 1997 (ISCED 97). *List of educational levels*. Available at: https://ec.europa.eu/eurostat/cache/metadata/Annexes/educ_uoe_h_esms_an2.htm. [Accessed on 4th July 2021].

Jacoby, S. F., Tach, L., Guerra, T., Wiebe, D. J. and Richmond, T. S. (2017). The health status and well-being of low-resource, housing-unstable, single parent families living in violent neighbourhoods in Philadelphia, Pennsylvania. *Health and Social Care in the Community*. doi: 10.1111/hsc.12345.

Jalil, H. H. and Iqbal, M. (2010). Urbanisation and Crime: A Case Study of Pakistan. *Pakistan Development Review*, 49.

Krannich, R. S., Berry, E. H. and Greider, T. (1989). Fear of crime in rapidly changing rural communities: a longitudinal analysis. *Rural Sociology*, 54, 195–212.

Krivo, L. J., Peterson, R. D., Rizzo, H. and Reynolds, J. R. (1998). Race, segregation, and the concentration of disadvantage: 1980–1990. *Social Problems*, 45, 61-80.

Krueger, J. S. and Lewis-Beck, M S. (2008). Is OLS dead? *The Political Methodologist*, 15(2), 2–4.

Kujala, P., Kallio, J. and Niemelä, M. (2019). Income inequality, poverty, and fear of crime in Europe. *Cross-Cultural Research*, 53, 163–185.

LaGrange, R. L. and Ferraro, K. F. (1989). Assessing age and gender differences in perceived risk and fear of crime. *Criminology*, 27, 697–719.

Lane, J. and Meeker, J. W. (2004). Social disorganization perceptions, fear of gang crime, and behavioral precautions among Whites, Latinos, and Vietnamese. *Journal of Criminal Justice*, 32, 49-63.

Lee, M. T. and Martinez, R. Jr. (2009). Immigration reduces crime: An emerging scholarly consensus. In *Immigration, Crime and Justice*, ed. William F. McDonald. Bingley, UK: Emerald Group.

Liska, A. E., Lawrence, J. J. and Sanchirico, A. (1982). Fear of Crime as a Social Fact. *Social Forces* 60, 760–70.

Lorenc, T., Clayton, S., Neary, D., Whitehead, M., Petticrew, M., Thomson, H., Cummins, S., Sowden, A. and Renton, A. (2012). Crime, fear of crime, environment, and mental health and wellbeing: mapping review of theories and causal pathways. *Health Place*, 18, 757–765. doi: 10.1016/j.healthplace.2012.04.001.

Lorenc, T., Petticrew, M., Whitehead, M., Neary, D., Clayton, S., Wright, K., Thomson, H., Cummins, S., Sowden, A. and Renton, A. (2013a). Environmental interventions to reduce fear of crime: systematic review of effectiveness. *Systematic Reviews*, 2, 30.

Lorenc, T., Petticrew, M., Whitehead, M., Neary, D., Clayton, S., Wright, K., Thomson, H., Cummins, S., Sowden, A. and Renton, A. (2013b). Fear of crime and the environment: systematic review of UK qualitative evidence. *BMC Public Health*, 13, 496.

Markowitz, F. E., Bellair, P. E., Liska, A. E. and Liu, J. (2001). Extending Social Disorganization Theory: Modeling the Relationships between Cohesion, Disorder, and Fear. *Criminology*, 39, 293-319.

Maxfield, M. G., Weiler, B. L. and Widom, C. S. (2000). Comparing self-reports and official records of arrests. *Journal of Quantitative Criminology*, 16(1), 87-110.

McDonald, J. T. and Kennedy, S. (2004). Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. Social Science and Medicine, 59, 1613–27.

Mesch, G. S. (2000). Perceptions of risk, lifestyle activities, and fear of crime. *Deviant Behavior*, 21, 47–62.

Miceli, R., Roccato, M. and Rosato, R. (2004). Fear of crime in Italy. Spread and determinants. *Environment and Behaviour*, 36(6), 776–789.

Morissens, A. (2018). The role of universal and targeted family benefits in reducing poverty in single-parent families in different employment situations. In R. Nieuwenhuis & L. C. Maldonado (Eds.), *The triple bind of single-parent families. Resources, employment and policies to improve well-being*, 359-381. Bristol: Policy Press.

Nakhaie, M. R. and Kazemipur, A. (2013). Social capital, employment and occupational status of the new immigrants in Canada. *Migration and Integration*, 14, 419–437. doi:10.1007/s12134-012-0248-2.

Ollenburger, J. (1981). Criminal victimisation and fear of crime. *Research on Ageing*, 3, 101-118.

Ortega, S. T. and Myles, J. L. (1987). Race and Gender Effects on Fear of Crime: An Interactive Model with Age. *Criminology*, 25, 133–52.

Ottaviano, G. I. P. and Peri, G. (2012). Rethinking the Effects of Immigration on Wages. *Journal of the European Economic Association*, 10, 152–197.

Pantazis, C. (2000). Fear of crime, vulnerability and poverty. *British Journal of Criminology*, 40, 414–436.

Parker, K. D. (1988). Black-White Differences in Perceptions of Fear of Crime. *The Journal of Social Psychology*, 128(4), 487–98.

Pearson, A. L. and Breetzke, G. D. (2014). The association between the fear of crime, and mental and physical wellbeing in New Zealand. *Social Indicators Research*, 119(1), 281–294. http://dx. doi.org/10.1007/s11205-013-0489-2.

Pedersen, P. J., Pytlikova, M., and Smith, N. (2008), Selection and Network Effects: Migration Flows into OECD Countries. 1990–2000, *European Economic Review* 52, 1160–1186.

Peri, G. and Sparber, C. (2009). Task Specialization, Immigration, and Wages. *American Economic Journal: Applied Economics, American Economic Association*, 1, 135–169.

Randa, R. and Mitchell, M. (2018). Vulnerability, context, and fear of victimization: Exploring race and ethnicity. *Journal of Ethnicity in Criminal Justice*, 16, 22–39.

Reid, L. W. and Konrad, M. (2004). The Gender Gap in Fear: Assessing the Interactive Effects of Gender and Perceived Risk on Fear of Crime. *Sociological Spectrum*, 24, 399–425.

Renauer, B. C. (2007). Reducing fear of crime: citizen, police, or government responsibility? *Police Quarterly*, 10, 41–62.

Sampson R- J. (1987). Urban Black Violence: The Effect of Male Joblessness and Family Disruption. *American Journal of Sociology*, 93, 348–82.

Sampson, R. J. (2008). Rethinking Crime and Immigration. *Contexts*, 7(1), 28-33.

Sampson, R. J. and Groves, W. B. (1989). Community structure and crime: Testing social disorganization theory. *American Journal of Sociology*, 94, 774-802.

Sampson, R. J., Raudenbush, S. W. and Earls, F. (1997). Neighbourhoods and Violent Crime: A Multilevel Study of Collective Efficacy. *Science*, 277, 918–24.

Scarborough, B. K., Like-Haislip, T. Z., Novak, K. J., Lucas, W. L. and Alarid, L. F. (2010). Assessing the relationship between individual characteristics, neighborhood context, and fear of crime. *Journal of Criminal Justice*, 38, 819–26

Shaw, C. R. and McKay, H. D. (1969 [1942]), *Juvenile Delinquency and Urban Areas: A Study of Rates of Delinquency in Relation to Differential Characteristics of Local Communities in American Cities*. Chicago and London: Chicago University Press.

Shapiro, A. and Keyes, C. (2008). Marital status and social well-being: are the married always better off? *Social Indicators Research*, 88, 329–346.

Shelley, W. W., Pickett, J. T., Mancini, C., McDougle, R. D., Rissler, G. and Cleary, H. (2021). Race, Bullying, and Public Perceptions of School and University Safety. *Journal of Interpersonal Violence*, 36, 824–849. doi:10.1177/0886260517736272.

Shopeju, J. O. (2007). Urbanization and crime in Nigeria. *ASSET Series C*, 2(1), 154–163.

Smith, L.N. and Hill, G.D. (1991). Perceptions of crime seriousness and fear of crime. *Sociological Focus*, 24(4), 315-327.

Smolej, M. and Kivivuori, J. (2006). The relation between crime news and fear of violence. *Journal of Scandinavian Studies in Criminology and Crime Prevention*, 7, 211–227. doi: 10.1080/14043850601002429.

Stafford, M., Chandola, T. and Marmot, M. (2007). Association between fear of crime and mental health and physical functioning. *American Journal of Public Health* 97, 2076–2081.

Thornberry, T. P. and Krohn, M. D. (2002). Comparison of self-report and official data for measuring crime. In: Pepper JV, Petrie CV, eds. *Measurement Problems in Criminal Justice Research: Workshop Summary.* Washington, DC: National Academies Press; 43–94.

Toseland, R. (1982). Fear of crime: who is most vulnerable. *Journal of Criminal Justice*, 10, 199-209.

Tulloch, M. (2000). The meaning of age: Differences in the fear of crime. *British Journal of Criminology*, 40, 451–467. doi:10.1093/bjc/40.3.451.

Valentová, M. and Alieva, A. (2018). Do non-EU immigrants exhibit different patterns of participation in voluntary associations to those of natives and EU immigrants? *Ethnic and Racial Studies*, 41, 804–823. doi:10.1080/01419870.2017.1297844.

Vasiljevic, Z., Svensson, R., and Shannon, D. (2020). Immigration and crime: A timetrend analysis of self-reported crime in Sweden, 1999–2017. *Nordic Journal of Criminology*, 21, 1–10.

Vauclair, C. M. and Bratanova, B. (2017). Income inequality and fear of crime across the European region. *European Journal of Criminology*, 14(2), 221–241.

Verbeek, M. (2008). Pseudo-panels and repeated cross-sections. In Matyas, L. and Sevestre, P. (eds), *The Econometrics of Panel Data - Fundamentals and Recent Developments in Theory and Practice* (Advanced Studies in Theoretical and Applied Econometrics, Volume 46, pp. 369-383). Berlin: Springer-Verlag.

Verbeek, M. and F. Vella (2005), Estimating Dynamic Models from Repeated Cross-Sections. *Journal of Econometrics*, 127, 83–102.

Wanner, R. A. and Caputo, T. C. (1987). Punitiveness, fear of crime, and perceptions of violence. *Canadian Journal of Sociology*, 12, 331–44.

Weinrath, M. and Gartrell, J. (1996). Victimization and fear of crime. *Violence and Victims*, 11, 187–197.

Wikström, P. O. H. and Dolmén, L. (2001). Urbanisation, neighbourhood social integration, informal social control, minor social disorder, victimisation and fear of crime. *International Review of Victimology*, 8, 163–182.

Will, J. A. and McGrath, J. H. (1995). Crime, neighborhood perceptions, and the underclass: The relationship between fear of crime and class position. *Journal of Criminal Justice*, 23, 163-176.

Wu, Y., Klahm, C. F. and Atoui, N. (2017). Fear of crime among Arab Americans in a culture of fear. *Ethnic and Racial Studies*, 40(14), 2481-2500. DOI: 10.1080/01419870.2016.1252462.