Ethnicity and neighbourhood attainment in England and Wales: a study of second generations' spatial integration

Carolina V. Zuccotti

European University Institute

Abstract

Ethnic minorities' spatial concentration and their predominance in deprived areas are two well-known patterns that characterize Britain's social landscape. However, little is known about ethnic minorities' opportunities for spatial integration, especially those of the second generations. Using a large-scale longitudinal dataset of England and Wales covering a forty-year period (1971-2011), in combination with aggregated Census data, the article examines ethnic inequalities in access to neighbourhoods with varying levels of ethnic concentration and deprivation. On equality of individual, social origin and childhood neighbourhood characteristics, second generation ethnic minorities are less likely than white British individuals to reside in 'whiter' and less deprived neighbourhoods. For most minorities, these differences reduce among those with higher education and a higher social class, in line with weak place stratification/ethnic enclave. Growing up in areas with high ethnic concentration and high deprivation has a particularly strong 'retention effect' among second generation Asians.

Keywords

1 INTRODUCTION

As in many other destination countries around the world, two well-known patterns characterize the spatial location of immigrants and their children in the UK (also called *ethnic minorities*). First, they tend to be concentrated in space (Simpson 2012); and, second, they tend to live in areas with high deprivation, as measured with the Index of Multiple Deprivation[1] (Jivraj and Khan 2013). To date, and with some exceptions (e.g. Finney 2011, Coulter and Clark 2018), most of the research on ethnic minorities' spatial patterns is centred on spatial segregation and residential moves from a macro perspective, i.e. not focused on individuals. Studies have been dedicated, for example, to the analysis of spatial segregation indices (Simpson 2012, Catney 2017, Jones et al. 2015) and internal migration rates (Simpson and Finney 2009, Catney and Simpson 2010). This macro perspective has also been used to explore the links between neighbourhood deprivation and ethnic concentration (Harris, Johnston, and Manley 2017).

While these studies are fundamental for understanding how ethnic segregation evolves over time and how this connects to neighbourhood deprivation, they are not sufficient for understanding the relationship between ethnic and spatial inequalities. One of the key interests of researchers dedicated to the study of (in)equality of outcomes (of any kind, including those related to neighbourhoods) across groups, is whether and to what extent these inequalities hold after we consider (in)equality of individual and social origin characteristics. This approach, strongly connected to the social stratification literature (Boudon 1973, Hout and DiPrete 2006), has increasingly been incorporated into the study of educational and labour market outcomes of ethnic minorities in the UK (Heath and Cheung 2007, Platt 2005b, Zuccotti 2015a), especially those of second generation minorities born and/or raised in the country. The observed

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[1] The IMD is calculated through a weighting procedure, using the following dimensions: income, employment, health, education, barriers to housing and services, crime, and living environment. Note that this paper uses another well-known measure of deprivation for the analysis: the Carstairs Index (Carstairs and Morris 1991).

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differences between ethnic minorities and white British, after controlling for these characteristics, have often been termed as 'ethnic penalties' (Heath and Cheung 2007). However, this approach has only marginally been used to study neighbourhood outcomes. A key issue is whether ethnic minorities, and the second generations in particular, reside in or move to less ethnically concentrated and less deprived neighbourhoods to the same extent as white British individuals, once individual, social origin, and childhood neighbourhood characteristics – which all play a role in neighbourhood choice – have been taken into consideration. Furthermore, it is also of interest to understand whether these factors play out differently on neighbourhood outcomes across ethnic groups. These questions are at the core of the well-known models of spatial assimilation, place stratification and ethnic enclave (Massey and Denton 1985, Logan and Alba 1993, Bolt and van Kempen 2010), designed to explain the spatial dimension of ethnic inequalities (or the lack thereof). While these models have been largely tested in the US (Crowder, South, and Chavez 2006, Logan and Alba 1993, Logan, Zhang, and Alba 2002, Fischer and Lowe 2015), their application to Western Europe (Bolt and van Kempen 2010, Schaake, Burgers, and Mulder 2013, van Ham et al. 2014, McAvay 2018), and to the UK in particular (Coulter and Clark 2018), remains limited.

In this study, I use a large-scale longitudinal dataset of England and Wales covering a forty-year period (1971-2011) in combination with aggregated Census data to empirically test the three models of spatial integration for the most numerous non-white *second generation* ethnic minority groups in the UK. The longitudinal nature of this dataset allows for a consideration of key factors that influence neighbourhood choice, including not only an individual's characteristics (like education or social class), but the characteristics of the neighbourhood where he or she grew up, as well as their social origins, such as parental socioeconomic

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resources. I study two dimensions of *neighbourhood attainment:* [2] neighbourhood ethnic concentration and neighbourhood deprivation. These refer to two different facets of ethnic minorities' spatial integration, connected to the ethnic and socioeconomic composition of neighbourhoods in which they reside. The paper focuses on three questions. First, I look at ethnic groups' propensities to reside in neighbourhoods with less ethnic concentration and less deprivation, given individual, social origin and childhood neighbourhood characteristics (Question 1). Next, I explore whether the role of education and that of social class play out differently with regard to neighbourhood attainment for different groups (Question 2). Finally, I explore the role of childhood or 'origin' neighbourhood characteristics on ethnic groups' neighbourhood attainment (Question 3).

The UK presents a valuable case study for studying ethnic differences in neighbourhood attainment, given its established and long-standing migrant-origin population. In 2011, around 12 percent of the population self-identified as belonging to a non-white ethnic minority group; among these, more than 40 percent were born in the UK. I distinguish the most numerous non-white groups: Indian, Pakistani, Bangladeshi, Caribbean, and African. Their contrasting migration histories and settlement patterns (Phillips 1998), socioeconomic resources (Platt, Simpson, and Akinwale 2005), cultural values and religion (Peach 2005, Khattab and Modood 2015), and levels of spatial segregation (Catney 2017) allow me to develop divergent expectations in terms of their spatial integration.

This paper is, to the best of my knowledge, the first to systematically look at patterns of neighbourhood attainment among second generation ethnic minorities in comparison with the majoritarian white British population. In so doing, it directly engages with the increasing policy debates in the UK about the social and spatial integration of ethnic minorities, (Casey 2016,

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[2] Neighborhood attainment can be understood more generally as neighbourhood "opportunities" or "achievements".

Shaw et al. 2016, Cabinet Office 2017). A key finding is that ethnic segregation and its association with deprivation – which are at the centre of this debate (HM Government 2018) – are strongly associated with how childhood neighbourhood characteristics and individual resources influence different ethnic groups' spatial opportunities.

2   THEORETICAL AND EMPIRICAL BACKGROUND

2.1   Spatial assimilation and other models of spatial integration

Currently, three main models dominate our understanding of spatial integration (or its absence) among immigrants and their children.[3] The 'classic' model of *spatial assimilation*, formalized by Massey (1985), states that as immigrants acculturate and improve their socioeconomic situation in destination countries, they also transform these 'gains' into residential gains, moving to 'whiter' and less deprived areas. Studies have looked, for example, at the role played by language proficiency, length of residence in the country (Alba et al. 1999), education (Crowder, Pais, and South 2012), income (Logan and Alba 1993, Coulter and Clark 2018, South, Crowder, and Chavez 2005) or wealth (Crowder, South, and Chavez 2006, Woldoff 2008). This model predicts that differences in neighbourhood attainment between minority and majoritarian groups will disappear among those with more resources. A 'stricter' definition of spatial assimilation could be one that defines it as the disappearance of the migrant-origin or ethnicity effect, independently of these resources. Spatial assimilation in this case would imply the attainment of similar neighbourhoods across ethnic groups given similar individual, social origin and origin neighbourhood characteristics. This definition becomes more relevant when applied to ethnic minorities raised in the destination country – as the ones studied here – as it acknowledges the fact that individuals can have different resources and be raised in different socioeconomic contexts, which provide them with different opportunities.

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[3] See Crowder and Krysan (2016) for a critical review of these.

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Both definitions of spatial assimilation can be observed in the 'neighbourhood attainment model' (see Figure 1), where the characteristics of the neighbourhood of residence (Y-axis) are set as a function of cultural and socioeconomic factors (X-axis) (Alba and Logan 1993, Logan and Alba 1993).

Figure 1

Next to spatial assimilation, two other models of spatial integration were developed: *place stratification* and *ethnic enclave.* These models acknowledge the fact that individuals of migrant origin have different preferences and constraints regarding their choice of a neighbourhood (Crowder, South, and Chavez 2006, Bolt and van Kempen 2010, Peach 1996). In practice, these models expect that, given equality of characteristics, ethnic minorities will not attain similar neighbourhoods as the majoritarian population. This also applies to those with better socioeconomic and cultural resources, and here Logan and Alba (1993) point to varied returns to these resources that different groups might experience: they call it 'weak' and 'strong' versions of the model (see Figure 1). The weak version implies that ethnic inequalities in access to neighbourhoods reduce among those with more socioeconomic resources, while the strong version points to the opposite.

The difference between place stratification and ethnic enclave models lies in the explanations they provide as to why spatial assimilation might not occur. The place stratification model emphasizes an ethnic disadvantage or *constraint* that prevents ethnic minority individuals from living in a desired location. This constraint is mainly associated to external factors, including discrimination in the public and private housing markets, but also harassment (Riach and Rich 2002, Roscigno, Karafin, and Tester 2009, Klink and Wagner 1999). Conversely, the ethnic enclave model[4] (Bolt and van Kempen 2010, Schaake, Burgers,

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[4] Ethnic enclave might also refer to 'ethnic communities', in terms of Logan, Zhang, and Alba (2002), although these are hard to identify in our data. Our definition of 'ethnic enclave' is more linked to residential location than to work location, though these might be linked in practice (Sanders and Nee 1992). Note also that we could argue

and Mulder 2010) is based on *preferences*, and states that different groups have divergent ideas of what constitute desirable housing or location (Özüekren and van Kempen 2002), including a neighbourhood's ethnic composition. Preferences are partly connected to the role of kinship and social networks in the neighbourhood (Galster 2012). In the case of ethnic minorities, being close to co-ethnics might help reaffirm the own ethnic/religious identity or increase the sense of belonging or subjective wellbeing (Knies, Nandi, and Platt 2016), by means of attending churches or social centres with members of the same group. Practical benefits could also be obtained from living in ethnically concentrated neighbourhoods, such as the opportunity to buy food from ethnic groceries and restaurants. While the ethnic enclave model emphasizes ethnic minorities' preferences (Logan, Zhang, and Alba 2002, Clark 2002), this does not disregard the fact that white majority's preferences to be close to kin or social networks (Coulter, van Ham, and Findlay 2016) or to be close to other white members (Clark 1991) might also play a role in ethnic spatial inequalities. As demonstrated by Schelling (1971), individuals' preferences for in-group members (be these white majority or ethnic minority) are an important factor in explaining why the spatial segregation of different groups may persist over time, even without explicit discrimination or harassment mechanisms.

Empirical research testing models of spatial integration often finds, first, that ethnic inequalities in neighbourhood attainment remain after cultural and socioeconomic resources have been taken into consideration; and second, that the effect of these resources on neighbourhood attainment vary considerably by ethnic group and by neighbourhood outcome. Studies have pointed, for example, to models of 'classic' and 'strong' place stratification for black Africans in the US, when studying access to wealthier areas (Logan and Alba 1993, Woldoff 2008, Woldoff and Ovadia 2009). The 'weak' version of this model was also observed,

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that the 'classic' form of spatial assimilation has elements of the place stratification and ethnic enclave models, if the strict definition of spatial assimilation is used.

but mainly when the dependent variable is white concentration (Alba and Logan 1993, Crowder, South, and Chavez 2006, South, Crowder, and Pais 2008). The few studies that have dealt with these issues in Western Europe often found spatial integration models that are in line with 'classic' or 'weak' place stratification (Lersch 2013, Schaake, Burgers, and Mulder 2013, Coulter and Clark 2018, Zorlu and Latten 2009). These findings have been attributed to discrimination, but also to strong ethnic ties among some of the groups.

2.2   The role of origin neighbourhoods

Earlier in the text, I argued that in order to identify ethnic inequalities in neighbourhood attainment, individual and household characteristics should be taken into consideration. This research includes not only commonly used variables (age, education, social class, civil status and presence of children in the household) and socioeconomic resources available to individuals during their childhood or early youth (see also: Woldoff 2008, Woldoff and Ovadia 2009), but also a crucial predictor of neighbourhood attainment: the characteristics of childhood or 'origin' neighbourhoods (also recently incorporated in many studies, both in the US, e.g. Swisher, Kuhl, and Chavez 2013, Sharkey 2012, South et al. 2016, McDowell, Rootham, and Hardgrove 2014, and in Europe, e.g. McAvay 2018, van Ham et al. 2014). Knowing the characteristics of origin neighbourhoods is central to neighbourhood attainment studies because there is a strong relationship between the types of neighbourhoods individuals live in at different points in their lives (see South et al. 2016 who summarize key mechanisms). Most importantly, research also shows how this relationship is very much dependent on race or ethnicity (Sharkey 2008, South et al. 2016). Swisher, Kuhl, and Chavez (2013) show, for example, that Black and Hispanic groups are more likely to remain in poor areas over time, compared to non-Hispanic whites: neighbourhood poverty is, therefore, more of a 'poverty trap' for these groups. Similar findings are shown in a studies done in Sweden (van Ham et al. 2014) and in France (McAvay 2018). In the spirit of these studies that emphasize a 'life course perspective' in the study of

neighbourhood attainment, the present study also addresses the role of origin neighbourhoods on later neighbourhood outcomes across groups.

A second advantage of studying, specifically, the role of origin neighbourhoods' *ethnic concentration* is that it may help us identify ethnic enclave mechanisms. Origin neighbourhoods are spaces of early socialization (Urban 2009) where preferences derived from sharing the space with members of the same ethnic group may develop; in particular, this could be expected from groups known for their strong ethnic ties and cultural bonds. I would expect the desire for an 'ethnic enclave' to be stronger among those raised in areas with a higher share of members of the same ethnic minority group, given that they have been socialized in that environment. These developed preferences may, in turn, play a role in decisions about where to live in adult life (South et al. 2016), and hence create a 'retention effect' for those raised in areas with high (co-)ethnic concentration. Conversely, it is probably less likely that an 'origin neighbourhood effect' connected to ethnic concentration is related to place stratification mechanisms. If discrimination, harassment, or any other forms of intolerance of ethnic minorities were present, the place where members of ethnic minorities lived at a young age should matter less than ethnicity itself. In other words, the level of discrimination experienced in, for example, the housing market, should mostly vary by ethnicity, and be (more) constant for individuals with the same ethnicity but different neighbourhoods of origin.

All in all, and bearing in mind that the proposed arguments may have limitations,[5] the analysis will shed light on an under researched topic in the UK, namely the effect of childhood neighbourhoods on adult ones for different ethnic groups.

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[5] E.g. being socialized in a 'whiter' area might provide extra skills to avoid discrimination, or preferences for ethnic neighbourhoods might also reflect the perceived risk of racial harassment (Phillips 1998; Peach 1998).

2.3   UK context and expectations

Historically, ethnic minorities in the UK have tended to concentrate in the main metropolitan areas – London in particular – following the jobs created there after the Second World War. The initial settlement of most non-white immigrants was marked by poverty and hostility (Phillips 1998). Immigrants were located either in poor private accommodations or in the worst owner-occupied houses. Spatial segregation started to emerge as a problem. Moreover, the link between ethnicity and deprivation became gradually evident: many minorities were found to be trapped in marginal areas in regions suffering from industrial decline, which would later on affect their housing and employment opportunities (Phillips 1998). Over time, segregation measured with one of the most popular indicators – the dissimilarity index (D) – has tended to decrease for all groups (Catney 2016); the same was observed to the relationship between ethnic concentration and deprivation (Jivraj and Khan 2013). This is likely to be partly connected to improvements in terms of discrimination in the housing market, especially after the Race Relations Act was introduced in 1967 and when local authority housing was opened to ethnic minorities in the late 1960s. However, ethnic segregation and the concentration of minorities in deprived areas both still very much characterize the UK's social landscape. Pakistanis and Bangladeshis are the most segregated groups in the UK (Catney 2017), with D values that reach almost 80 percent in some metropolitan areas in 2011 (Zuccotti 2015b). They are also the most likely to be found in deprived areas (Jivraj and Khan 2013). Recent research based on segregation indices also suggests that Pakistanis are intensifying their spatial clustering and exposure to co-ethnics (Zuccotti 2015b).

Aligning with the place stratification model, the persistence of these spatial patterns is likely to be related, in part, to discrimination by estate agents and housing corporations. There is also the problem of harassment that is known to occur in some areas, which makes these areas undesirable to ethnic minorities (Phillips 1998, 2006, Bowes, Dar, and Sim 2002). For

example, a study among Caribbeans living in council housing showed that their decision making regarding relocation was strongly motivated by fear of harassment (Phillips 1998). Similarly, a study in the city of Bradford (Phillips 2006) showed that agents shared stereotyped views and mistrust of Pakistanis and Bangladeshis. Fear of rejection and victimisation was also a recurrent theme among these groups, who have also become particularly vulnerable since the 2001 riots in northern England and the London terrorist attacks (Alexander 2002, Phillips 2006).

In line with the ethnic enclave model, preferences are also likely to play a role in maintaining ethnic spatial inequalities (Peach 1996). Although evidence of white British individuals seeking to avoid ethnic minorities is limited in the UK (Kaufmann and Harris 2015), the role of ethnic minority networks appears as a powerful source. Phillips (1998) showed, for example, that living close to family and community was an important consideration for Caribbean individuals applying for council housing. This preference for living close to co-ethnics was also found among Pakistani and Bangladeshi populations (Bowes, Dar, and Sim 2002, Bowes, Dar, and Sim 1997), especially among older people and married women, who are also likely to move to their husband's house after marriage (Finney 2011). For them, living outside the community might mean more dependence on men and fewer possibilities for developing a network of acquaintances and friends. More generally, Asian populations in the UK – and Pakistanis and Bangladeshis in particular – have a strong sense of community, and concepts of control, family honour and status dominate (Peach 2005). It is therefore likely that a preference for residing next to co-ethnics is stronger for these two groups, compared to other ethnic minorities. This evidence denoting preferences associated with ethnicity would be in line with a study showing that, on equality of individual characteristics, some ethnic minority groups (Pakistani, Bangladeshi and Black groups) tend to move shorter distances than white British individuals (Finney 2011).

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Socioeconomic resources, wealth and education – and how these resources are distributed and used across ethnic groups – are also important factors that may help to explain ethnic and socioeconomic segregation. The overrepresentation of minorities in lower social class origins (Platt 2010, Zuccotti and O'Reilly 2018) and the existence of ethnic penalties in the labour market (Cheung and Heath 2007) are already well-known phenomena in the UK, and may impact residential choices. In fact, ethnic inequalities and the presence of a social or income gradient in residential mobility and/or neighbourhood attainment has already been shown by some studies in the UK (Catney and Simpson 2010, Coulter and Clark 2018). These studies, which look at residential moves between two consecutive years (although focusing on different datasets and years), show evidence in favour of place stratification/ethnic enclave processes; in some cases, with a reduction of these inequalities among those with more socioeconomic resources (weak version). In particular, Coulter and Clark (2018), who use a wide range of control variables in their analyses, show that Asian groups are the least likely to move to whiter areas, compared to black groups and white British individuals. Both Asian and black groups are also more likely to move to neighbourhoods with higher deprivation levels, compared to white British individuals. As regards the role of household income on moves to whiter areas, the authors show that it has positive effect for Asians, but no effect for white British or Black groups: this implies that ethnic inequalities for Asians (when compared to white British) reduce among those with more resources (weak version). Income plays a positive role in moves to less deprived areas for all groups; however, ethnic inequalities in access to better off neighbourhoods remain similar for all income levels (classic version). The present study is quite different to our predecessors, not only because it focuses on individuals born and/or raised in the UK, but also because it considers a much longer time span, as well as key social origin and origin neighbourhood variables.

A final note in terms of our expectations and potential findings regards how geography is acknowledged in this study. As argued before, this study partly considers the individuals' initial geographical constraints by looking at the role of origin neighbourhoods (in terms of ethnic concentration and deprivation) on later neighbourhood attainment. However, our data does not really allow knowing *where* individuals live at different points in their lives. It is likely that the initial geographical distribution of groups – which is linked to the structure of ethnic spatial segregation and neighbourhood deprivation – has an impact on later spatial patterns and residential moves. Even without discrimination or in-group preferences, we could think, for example, that it is probably easier for white British individuals to access less deprived and less ethnically concentrated areas without moving far. White British individuals have in general much higher exposure to co-ethnics as well as much higher clustering levels (Zuccotti 2015b), which is connected to the fact that they constitute more than 85% of the population. They are also much more likely to reside in suburban or rural areas, which have in general lower deprivation levels compared to urban inner areas, where ethnic minorities predominate (The Area Based Analysis Unit 2009, Simpson and Finney 2009). Housing availability across different urban/suburban locations, or across areas with different socioeconomic levels, is another factor that might also influence our results. Although the present study does fully account for these additional geographical constraints, I have done a series of additional analyses looking at the level of population density of the location where individuals lived when they were young (which can be considered as a proxy of the urban/rural divide). These extra analyses, explained in more detail in section 4.5, provide additional 'geographical context' to the main findings of this study.

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3 DATA AND METHODS

3.1 Sample structure and unit of analysis

The analysis is based on the ONS Longitudinal Study (ONS-LS), a unique dataset that links census information and life events for a 1% sample of the population of England and Wales. More specifically, the ONS-LS consists of a set of census records for individuals linked between successive censuses (Hattersley and Creeser 1995) (1971, 1981, 1991, 2001 and 2011). Slightly more than 500,000 individuals can be found in each census point; people who have information in all census points are around 200,000. In total, around 1,000,000 records cover the full 40 years and five data points of the study. In addition to its large sample, this data is unique in that both household and aggregated census data are attached to each individual and for each census point. This offers a long-term perspective on the socioeconomic, family and neighbourhood contexts of individuals.

Following Platt (2005b), the cases examined here are of individuals who were between 0 and 15 years old in 1971 and 1981 and between 10 and 15 years old in 1991 and who lived with at least one parent (mother and/or father) at that time-point. These individuals are then followed up in 2001 and 2011, when they are between 20 and 55.[6] The main rationale behind this selection is that it allows for the initial socioeconomic and neighbourhood conditions in which individuals are raised – *origin* characteristics (1971-1991) – to be separated out from their *destination* characteristics, their outcomes in later life (2001-2011); namely, their socioeconomic and neighbourhood conditions when they are adults. This type of structure allows me to reduce the effects of the self-selection of individuals into initial neighbourhoods,

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[6] Attrition in the ONS Longitudinal Study derives from eligible individuals not being enumerated at the relevant census, or errors in date of birth details, or through unregistered emigration. Overall, rates of attrition – around 18% across the whole period (Office for National Statistics 2014) – are nevertheless substantially lower than in conventional longitudinal surveys. While there is the risk that selective attrition may introduce bias and there is some evidence that propensity to attrition differs by ethnicity and ethnic concentration of neighbourhood, evidence suggests that effects on estimates are small (Platt 2005a).

as it was probably their parents (rather than themselves) who chose the *origin* location. At the same time, the design also facilitates the separation in time of the outcome variables (neighbourhood characteristics), measured in 2011, and mediating variables (education and social class, but also civil status and presence of children), measured in 2001. Figure 2 shows the sample structure with age specifications.

Figure 2

The unit of analysis considered here is the pair of *origin-destination* variables. The maximum number of observations *per* individual is two, since individuals can be between 0 and 15 years of age at a maximum of two census-points between 1971 and 1991 and they need to be present both in 2001 and 2011. Around 70 percent of all cases in the data are single individuals. I use clustered standard errors in the multivariable analyses, to adjust for repeat observations of individuals.[7]

3.2 Groups under study and variables

This paper examines neighbourhood attainment among white British individuals (with UK-born parents) and individuals who identify themselves as belonging to an ethnic minority group (both of whose parents were born abroad; or one in the case of single-parent households).[8] Most of ethnic minority individuals were born in the UK; however, some also arrived in Britain aged fifteen years old or younger.[9] For the purposes of the analysis, I refer to both selections as *second generation ethnic minorities*. The analysis focuses on five ethnicities: Indian, Pakistani,

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[7] I have also explored the distribution of key variables (education, parental and individual's social class) for an ad-hoc dataset created by randomly selecting one unit of analysis per individual: the distribution of these variables is very similar for both datasets. The results of these analyses can be found in Zuccotti (2015b) or are available upon request.

[8] I exclude individuals who have "mixed parents" (i.e. one parent born abroad and one born in the UK) as well as those with UK-born parents (or one, for single-parent households).

[9] As a robustness check, the analysis was replicated for individuals who were between 0 and 5 years old in any of the three origin years. This was to explore whether the findings apply as well among those who have been mostly socialized in the UK (especially as regards socialization in school). The results are very similar to the ones presented in this paper (available upon request).

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Bangladeshi, Caribbean and African, who are identified by means of the ethnic self-identification Census question in 2011 (when missing, self-identification in 2001 or 1991 is used).

Two characteristics of neighbourhoods are considered in this study: ethnic concentration and deprivation. By 'neighbourhood' I mean the ward,[10] a geographical unit used in local government elections, which contains an average of 4,000 individuals. Data on ethnic concentration and deprivation comes from the Census. Both variables are expressed in population-weighted quintiles. In practice, neighbourhood ethnic concentration has five categories, where quintile 5 contains the wards with the highest concentration of non-white populations (Asian, black and other non-whites, excluding mixed-white ethnicities), where 20 percent of the non-white population lives. Neighbourhood deprivation is measured with the Carstairs scale (Norman and Boyle 2014), a widely used measure among ONS-LS users, made available by the Office for National Statistics. It summarizes four variables: proportion of male unemployment; proportion of overcrowded households; proportion of households with no car/van; and proportion of individuals from a low social class. For this five-category variable, quintile 5 contains the most deprived wards where 20 percent of the population lives. Neighbourhood information was attached to each individual in the ONS-LS for each year. It was not possible to use more detailed neighbourhood information due to disclosure policies; however, by being a relative measure, quintiles facilitate comparisons over time.

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[10] The ward is the key building block of UK administrative geography, being the geographical unit used to elect local government councillors in metropolitan and non-metropolitan districts, unitary authorities and the London boroughs in England and unitary authorities in Wales. Wards are very varied in terms of the population they contain (from 1 to around 40,000 individuals, depending on the year) and their size. In general, the smallest and most populous ones are in metropolitan areas, where the majority of ethnic minorities are found; while in the countryside, where people are more dispersed, wards tend to be bigger and less populated. Wards are also subject to change over time (see http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/administrative/our-changing-geography/boundary-changes/index.html). The ward is the only available geographical measure that could be used for the five censuses. For more details see (Zuccotti 2015b).

The first dependent variable is the probability of residing in neighbourhoods with low ethnic concentration (quintiles 1 and 2) in 2011. Table 1 shows the number of neighbourhoods (wards) and the average share of groups in neighbourhoods for the five neighbourhood ethnic concentration quintiles in 2011 (based on aggregated census data). Quintiles 1 and 2 have the highest number of wards with white British individuals. Quintile 1 – which comprises most wards in England and Wales – has on average 93 percent of white British individuals and 2.6 percent of non-whites. Quintile 2 is more mixed but still has, on average, a majority of white British individuals. It is also important to recall that quintiles 1 and 2 include areas with both high and low deprivation levels (see Table 2).

Table 1

In terms of the second dependent variable, one would ideally want to explore the probability of residing in the least deprived neighbourhoods. As observed in Table 2, wards that have the lowest deprivation levels for the most part are predominantly white, for which this analysis would be an even "stricter test" of spatial integration theories, capturing both dimensions of ethnic concentration and deprivation. However, the sample is too small for this purpose: there are very few ethnic minorities residing in the least deprived neighbourhoods in 2011. I therefore look at the probability of living in neighbourhoods with middle/low deprivation (quintiles 1 to 4), which allows for a more balanced distribution. A limitation of using this outcome variable is that preferences and constraints might be less relevant as explanations for an 'ethnic gap', given that some of these neighbourhoods might actually be ethnically mixed (preferences to be close to co-ethnics might be satisfied in an ethnically mixed neighbourhood, and discrimination or harassment might be less present).

Table 2

When looking at the effect of the origin neighbourhood on later neighbourhood attainment across groups, I use the same neighbourhood variables, but measured in 1971, 1981 and 1991.

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[11] In particular, I focus on the effect of having lived when young in quintile 5, which are the areas with the highest ethnic concentration and highest deprivation level. Although the argument for the ethnic enclave model is based on the potential contacts in the neighbourhood among members of the same ethnic group, the principal reason for choosing a 'non-white' origin variable for the main model is that it is equivalent to the dependent variable. It also allows for a general classification of neighbourhoods, as well as easier comparisons with white British population.[12] An important information is that, due to statistical disclosure policies, I am not able to identify whether individuals have actually made a residential move between two locations. The attainment of a certain type of neighbourhood might then be a new neighbourhood or the neighbourhood in which the individual lived when young.[13]

The two main mediating variables (measured in 2001) are education and social class; these are considered indicators of, respectively, cultural and socioeconomic resources. Although education has previously been linked to socioeconomic assimilation (Alba and Logan 1993) considering that a person with more education can usually obtain more economic resources, this study will treat education more as a cultural asset. This is for two main reasons. First, being more educated also means having spent more time in the educational system, which together with the family is one of the most important places for socialization. The level of education would then reflect the degree to which one is socialized in the culture and norms of mainstream

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[11] Non-whites are defined differently in each census point, given that the measurement of ethnicity varies across censuses: for 1971 and 1981 neighbourhood composition uses the variable "country of birth", while from 1991 it is based on a "self-identification" measurement. In 1971 and 1981 non-whites are all individuals born in the New Commonwealth, including Pakistan; in 1991, 2001 and 2011, non-whites are self-identified Indian, Pakistani, Bangladeshi, Caribbean, African, Chinese, Asian other, Black other, other ethnic group and Arab (only for 2011).
[12] As a robustness check, and only for the ethnic minorities, I have replaced ethnic concentration areas with 'co-ethnic' concentration areas where quintile 5 refers to areas with the highest number of members of a certain group (Table A1 in the Supplementary material shows, for 1981 and 2011, the relationship between these ethnic quintiles and non-white quintiles). The results (available upon request) are in line with the findings presented here.
[13] This is especially the case when studying neighbourhood deprivation, particularly for individuals moving across neighbouring quintiles (e.g. from quintile 5 to quintile 4). However, it applies, to a lesser extent, to the neighbourhood ethnic concentration variable. It is very unlikely that, for example, a neighbourhood with high ethnic concentration in 1981 would become a neighbourhood with low ethnic concentration in 2011, given how fast ethnic minority populations grow in the UK. I, therefore, assume that (at least most) neighbourhood improvements in terms of ethnic concentration are a consequence of individuals moving.

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society. Alongside this, education can have a separate impact on housing preferences and residential moves by providing, for example, a higher knowledge of how the housing market functions (Özüekren and van Kempen 2002). The second reason is that I will look at the effect of education after controlling for both background socioeconomic factors and social class: the role of education as a socioeconomic asset will therefore be, at least partly, netted out. Education is measured with a 3-category variable: Level 1 or less, Levels 2+3 and Level 4+ (university degree or more). The social class of individuals is measured with the National Statistics Socioeconomic Classification (Office for National Statistics 2010). This classification is based on the Erikson and Goldthorpe class schema (Erikson and Goldthorpe 1992) and was constructed to measure the employment relations and conditions of occupations. This study uses a reduced version of the schema, with four categories: Manual, Petit Bourgeoisie, Intermediate and Service.

Other key controls measured in 2001 are civil status, which, by including partner's ethnicity, helps to control for selection into neighbourhoods and the presence of children in the household. Social background characteristics in origin (measured in 1971-1991) are also considered: EGP parental social class (Erikson and Goldthorpe 1992), tenure, number of cars and number of persons *per* room. These variables are key predictors of life chances, including individuals' education and social class; their introduction in the models helps therefore to better capture the role of origin neighbourhoods (known to be associated with education and social class)[14] on neighbourhood attainment. The analyses also control for age, gender, number of census points in which the individual participated and the origin year. The categories of all variables can be seen in Table A2 in the Supplementary material.

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[14] See literature on neighborhood effects: e.g. van Ham et al. (2012).

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The analysis is organized as follows. Section 4.1 shows descriptive statistics; section 4.2 explores average differences in neighbourhood attainment across ethnic groups; sections 4.3 and 4.4 explore the moderating roles of education and social class and of origin neighbourhood, respectively; finally, and as additional analysis, section 4.5 explores the role of population density, a variable obtained from ONS-LS that refers to the immediate area[15] where the individual lives (at each census point). The analysis focuses, in particular, on the role of population density in origin (i.e. measured in 1971, 1981 and 1991). This variable has four categories: from 0 to 499 persons per square km, from 500 to 1999 persons per square km, 2000 to 3999 persons per square km and 4000 persons or more per square km. This classification divides the white British population in approximately four similar groups, while most ethnic minorities are concentrated in the last category (see Table 5).

4   RESULTS

4.1   Descriptive statistics

Figure 3 shows the total percentage of each ethnic group residing in neighbourhoods with low ethnic concentration and middle/low deprivation; Table 3 shows how this varies by education and social class (in 2001) and by origin neighbourhood (in 1971-1991). The well-known higher spatial segregation of Pakistanis and Bangladeshis is reflected in the fact that only around 35% of second generation Pakistanis and Bangladeshis live in neighbourhoods with low ethnic concentration; this grows to 50% for Indians and to around 40% for Caribbean and African populations. [16] In terms of deprivation, around 88% of white British individuals

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[15] I was not able to obtain the exact geography for which this was calculated, but it is likely not bigger than the Ward.

[16] Some cell counts, percentages and totals shown in the tables created with ONS-LS data have been modified in order to comply with publication rules established by the Office for National Statistics. These modifications, however, do not affect the main findings from the regression models.

live in neighbourhoods with middle/low deprivation; this falls to 67% for second generation Indians and to rather less than half for Pakistanis and Bangladeshis.

Figure 3

Table 3 shows that while being in a neighbourhood with low ethnic concentration in 2011 does not seem to be strongly connected to the educational level achieved nor to social class among the white British, this instead *does* seem to be the case for second generation ethnic minorities. Having a university education in 2001 has a particularly strong impact on Pakistanis' and Africans' neighbourhood attainment: their proportions in neighbourhoods with low ethnic concentration are around 17-19 points higher, compared to those with low education. For Indians and Caribbeans this effect is around half the size. Similarly, most second generation ethnic minorities who declare having a service class position in 2001 have a higher proportion in areas with low ethnic concentration, compared to ethnic minorities with a Manual class. The results in terms of neighbourhood deprivation shows that those with a higher education and a higher social class in 2001 have a higher probability of residing in a less deprived neighbourhood in 2011. This applies both to white British individuals and to second generation ethnic minorities; however, the effect is stronger among the latter. Overall, the greater role of the mediating variables for most ethnic minorities means that the gap in neighbourhood attainment between them and white British individuals is reduced for those with more socioeconomic and cultural resources.

Table 3

As regards variations by origin neighbourhood, we observe that there is in general a positive relationship between childhood and adulthood neighbourhoods' characteristics for all groups. However, important differences emerge between white British individuals and second generation ethnic minorities. Even white British individuals who lived in areas with high ethnic concentration and high deprivation in childhood are generally more likely to be found in areas

with low ethnic concentration and middle/low deprivation in 2011, compared to second generation ethnic minorities. Differences between minority groups are also noticeable. Second generation Pakistanis and Bangladeshis are the least likely to have experienced a change from a neighbourhood with high ethnic concentration and deprivation to one with low concentration or middle/low deprivation (e.g. only around 20 percent of Bangladeshis from highly concentrated origin neighbourhoods reside in neighbourhoods with low concentration in 2011). Caribbeans, Africans, and especially Indians have a higher probability of having experienced this change. We also observe that the effect of having lived in less concentrated and less deprived neighbourhoods is particularly strong for Pakistanis and Bangladeshis' neighbourhood attainment in 2011; and it is also much weaker for Caribbeans and Africans in terms of neighbourhood deprivation. In the following section, I present multivariable regression models in which I control for key individual, household, and social origin variables.

4.2 Neighbourhood attainment by ethnic group

Table 4 presents Average Marginal Effects derived from logistic regression models for two outcomes: the probability of being in neighbourhoods with low ethnic concentration, and the probability of being in neighbourhoods with middle/low deprivation. When multiplied by 100, the coefficients refer to the difference in percentage points with respect to the reference category. Model 1 controls for ethnic group and the characteristics of the origin neighbourhood (ethnic concentration/deprivation respectively); Model 2 adds origin neighbourhood deprivation/ethnic concentration respectively, social origin characteristics, and key individual and household level-variables. All models control for age, gender, origin year, and number of census points in which individuals participated (see full models in the Supplementary material: Table A2).

Table 4

Model 1 shows that – given equality of origin neighbourhood characteristics – second generation ethnic minorities are less likely to be found in areas with a low ethnic concentration

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and middle/low deprivation compared to white British individuals. After we control for key characteristics (Model 2), differences between ethnic groups remain, though reduced. The least likely to reside in neighbourhoods with low ethnic concentration are second generation Pakistanis and Bangladeshis (around 14% less likely, compared to white British individuals), while Indians are those with the smallest difference with respect to white British individuals (of around 7% points). In terms of neighbourhood deprivation, Pakistanis and Africans are among the most disadvantaged groups: they are around 15% points less likely to reside in neighbourhoods with middle/low deprivation, compared to white British individuals. Indians, again, have the lowest difference with respect to white British individuals: of around 5% points. These results are in line with previous findings that show the generally higher segregation levels of Pakistanis and Bangladeshis (Simpson 2012), as well as the generally lower prevalence of Indians in areas of high deprivation (Jivraj and Khan 2013). They are also in line with research by Coulter and Clark (2018); however, the present study suggests that pooling groups, as Coulter and Clark do, obscures important differences between them, especially when looking at Asian minorities.

All in all, the results suggest that white British individuals are more likely to reside in less ethnically concentrated and less deprived areas than second generation ethnic minority groups. These results hold even after we control for factors that are strong predictors of neighbourhood attainment. Pakistanis seem to be the least spatially integrated, with some of the lowest levels of neighbourhood attainment in both outcomes.

4.3 Neighbourhood attainment by ethnic group, education and social class

Next I explore to what extent gaining a higher education and a higher social class in 2001 impacts white British individuals' and second generation ethnic minorities' neighbourhood attainment differently in 2011. I look at this question by adding interactions between these variables and ethnic group (one model is done for each interaction: see Table A3 in the

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Supplementary material). In particular, I focus on the effect of having a university degree (vs. having a level 1 or less) and on the effect of having a service class (vs. a manual class) for different groups.

The interpretation of interactions in logistic regression models is not straightforward as in linear regression models (Norton, Wang, and Ai 2004). I have, therefore, computed contrasts[17] from these models (in Stata 14: StataCorp 2015). Contrasts show the marginal effects of ethnicity in the interaction; that is, they show, for two groups, the difference in the effect of having a university degree or a service class (vs. having a low education or a low social class) on neighbourhood attainment in 2011, and also show whether this difference is statistically significant. Contrasts are shown in Figure A1: when confidence intervals do not cross the zero line, it means that the effect of education/social class is different between the groups being compared at a p-value<0.05 (each ethnic group is compared to the white British). With some exceptions, most interactions are statistically significant.[18]

Figure 4

Figure 4 shows predicted values of neighbourhood attainment for each group and for individuals with low/high education and manual/service social class. For both neighbourhood outcomes, the effect of education and social class is often stronger for second generation ethnic minorities than for white British individuals. Results vary depending on the outcome and mediating variable under consideration. The effect of a university degree and of belonging to a service class makes it much more probable that Pakistanis will reside in less ethnically concentrated and less deprived areas. They increase their chances of inhabiting these neighbourhoods by 8 to 15 percent points, compared to low educated and low-class Pakistanis.

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[17] This command "tests linear hypotheses and forms contrasts involving factor variables and their interactions from the most recently fit model" (StataCorp 2013).
[18] Some p-values fall between 0.07 and 0.15: education*African (outcome=ethnic concentration), education* Pakistani, education* Caribbean and social class*Bangladeshi (outcome=deprivation). I include these results in the discussion.

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Bangladeshis' neighbourhood attainment also depends greatly on their social class (but not on their education): belonging to a service class provides around 12 percent points higher chances of living in less deprived and less concentrated neighbourhoods. Among Indians, a higher education and higher social class give respectively 9 and 12 percent points higher chances of being in a less deprived area; these effects are smaller when looking at ethnic concentration. For Caribbeans we observe an 8 percent point effect from holding a higher education when looking at neighbourhood deprivation, and a smaller effect of education and social class when focusing on ethnic concentration. Finally, for Africans we only observe an 8 percent effect from holding a higher education for ethnic concentration (even with limited statistical significance); however, in all other cases there are no differences with respect to white British individuals.

These findings, which in most cases imply that education and social class are more important for second generation ethnic minorities' (especially Asians) neighbourhood attainment than for white British individuals', can also be read in terms of the proposed spatial integration models. The fact that many second generation ethnic minority groups gain more from a higher education and a higher social class implies that gaps between them and white British individuals fall among those with better educational and social class resources. For example, the gap between white British individuals and Pakistanis in terms of their probabilities of residing in areas with low ethnic concentration falls from 24 percent among those in the manual class to 9 percent among those in the service class. This is one of the strongest effects observed: a reduction of around 15 percentage points. For other groups reductions vary between 4 and 11 percentage points. Since, in most cases, a gap remains, this suggests a model of weak place stratification/ethnic enclave. The only case of classical spatial assimilation is that of Indians for the attainment of neighbourhoods with lower deprivation (but not less concentration). This is interesting, as it shows that although educational and socioeconomic resources allow Indians to reside in neighbourhoods which are as 'good' as those where

equivalent white British individuals live, at the same time these neighbourhoods might not necessarily be predominantly white. Finally, the figure also suggests cases of classic place stratification/ethnic enclave: this is the case of Africans attaining middle/low deprivation neighbourhoods. A similar finding is observed when comparing Bangladeshis and white British individuals with different levels of education.

4.4   Neighbourhood attainment by ethnic group and origin neighbourhood

This section explores the effect of origin neighbourhoods on later neighbourhood characteristics for different groups. As argued before, this analysis can help identify ethnic enclave mechanisms but also potential poverty traps for the groups. I have added interaction terms between ethnic group and origin neighbourhoods characteristics' (see Table A4) and calculated contrasts to identify those that are statistically significant: in particular, I look at the effect of having lived at a young age in quintile 5 (see Figure A2). Statistically significant interactions are observed in most cases.[19] Figure 5 shows predicted values based on the models with interaction effects and all controls.

Figure 5

Origin and current neighbourhood's levels of ethnic concentration are positively related for all groups; however, the results reveal – as expected – that this relationship is stronger for Pakistanis and Bangladeshis and, to a lesser extent, for Indians and Caribbeans, than for white British individuals. Second generation Pakistanis and Bangladeshis who lived in quintile 5 in childhood have around 30-40 percent chances of living in areas with low ethnic concentration in 2011; this rises to around 80 percent for those from quintile 1. For white British individuals the effect is less strong: from 70 to 90 percent. The fact that Pakistanis and Bangladeshis raised in quintile 1 do not reach the same neighbourhood attainment as equivalent white British

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[19] Some p-values also fall between 0.09 and 0.15: origin deprivation*Caribbean and origin deprivation*African. I include these results in the discussion.

individuals might be evidence of discrimination. However, the larger gap among those raised in quintile 5 shows that having lived in more ethnically concentrated areas in childhood seems to have a greater "retention effect" for the minorities. This might point to the role of preferences, and therefore, to ethnic enclave mechanisms.

As regards deprivation, we observe a similar pattern when comparing second generation Pakistanis and Bangladeshis with white British individuals: the gap in terms of neighbourhood attainment is larger among those raised in areas with more deprivation (while it falls, but does not disappear among those raised in better-off areas). Among black groups we observe a different outcome. Although those raised in worse-off areas have better chances of improving their neighbourhood compared to Pakistanis or Bangladeshis from similar areas, having lived in areas with lower deprivation gives these groups a lower relative advantage when compared to white British individuals. For Africans this advantage is even close to null. The ethnic gap in terms of neighbourhood attainment is therefore larger among those raised in better-off areas.

4.5   Exploring the role of population density in origin

As argued before, ethnic minorities' and white British spatial opportunities are not only dependent on individual, social origin and origin neighbourhood characteristics, but also on other types of geographical constraints, especially those associated with the urban/rural divide. With the aim of better contextualizing the results of this study, I have performed additional analyses including a variable that measures the population density of the origin neighborhood (i.e. measured in 1971, 1981 and 1991). Although this is not strictly an urban/rural divide, since areas with low density might also belong to urban areas, it is nevertheless a good proxy. First, I have replicated the key models controlling for population density in origin. Second, I have run separated models with two samples, dividing between individuals who lived in highly dense areas (>4000 individuals per square km) when young and those who lived in middle-low density areas when young.

Table 5 shows the distribution of ethnic groups according to the level of population density in their origin neighborhoods. As expected, most ethnic minorities lived in areas with high population density when young; this is especially the case among black populations and Bangladeshis, most of whom are located in London. The data also shows that individuals from highly concentrated and deprived areas are also generally located in highly dense areas (see Tables A5 and A6).

Table 5

The results of the additional analyses are shown in Table 6. As expected, higher population density in origin is associated with a lower probability of attaining areas with less ethnic concentration and less deprivation (Density 1). Controlling for population density in origin does not change the effect of ethnicity. That is, on average differences between ethnic minorities and white British individuals in terms of neighborhood attainment (for both ethnic concentration and deprivation outcomes) remain the same as those observed in Table 4. This means that ethnic inequalities in neighborhood attainment prevail even after we consider the fact that ethnic minorities' origin neighborhoods are overrepresented in areas of high population density.[20]

Table 6

The next two models present the results for individuals from areas with high and low population density in origin. This test assumes that population density in origin might moderate how ethnicity, education, social class and other control variables affect neighbourhood outcomes. The results show that gaps in neighbourhood attainment (for both outcomes) between ethnic minorities and white British individuals are in general higher among individuals from

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[20] I have additionally controlled for population density in 2011. Differences between ethnic minorities and white British individuals reduce but remain statistically significant. I prefer, however, not to discuss this as part of my results, first, because population density in origin is more relevant as a control variable, since it establishes the starting point in terms of geographical opportunities; and second because adding population density in 2011 might be endogenous.

more densely populated areas.[21] This suggests that the urban environment might promote greater ethnic inequalities in neighbourhood attainment.

5   CONCLUSIONS AND LIMITATIONS OF THIS STUDY

The study of the unequal distribution of ethnic minorities in different types of neighbourhoods in the UK has mostly relied on segregation indexes or spatial correlations based on aggregated census data. However, in order to evaluate the opportunities that different groups have when searching for a place to live, one needs to consider a series of factors that might affect these choices, such as individual socioeconomic resources, the characteristics of the family of origin, and most importantly, the neighbourhood in which one was raised. This approach is at the core of the well-known models of spatial integration, and emphasizes the role of social origins and life course perspectives in the analysis of individuals' opportunities (Swisher, Kuhl, and Chavez 2013, Boudon 1973). To my knowledge, this is the first study in the UK to implement such an approach for the analysis of ethnic spatial inequalities.

This study has three main findings. *First*, there are ethnic inequalities in neighbourhood attainment. Even after controlling for individual resources, social origins and childhood neighbourhood characteristics, second generation ethnic minorities (in particular, Pakistanis, Bangladeshis and Africans) are less likely to reside in areas with low ethnic concentration and middle/low deprivation, compared to white British individuals. This suggests that housing market constraints or discrimination and/or ethnic-specific preferences (plus, potentially, other unmeasured characteristics connected to ethnicity or other resources) might play a role in second generation ethnic minorities' spatial location in the UK. *Second*, with some exceptions, ethnic inequalities in neighbourhood attainment decrease (but, in most cases, do not disappear) among those with more education and from a higher social class. This is in line with the model

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[21] We observe the opposite effect only for African when measuring access to less concentrated areas, but this might be related to the fact that there are very few Africans from middle-low dense areas.

of weak place stratification/ethnic enclave, and partly supports the recent study by Coulter and Clark (2018) for the UK. *Third*, the effect of the level of ethnic concentration of the origin neighbourhood on the level of ethnic concentration of the destination neighbourhood in 2011 is generally stronger for second generation ethnic minorities, particularly for Pakistani and Bangladeshi populations, than for white British individuals. This suggests that preferences for co-ethnics – connected to upbringing in neighbourhoods with high ethnic concentrations – might play a role in spatial integration, supporting therefore ethnic enclave mechanisms. It is no surprise that we observe this effect especially among populations known for having strong ethnic ties (Peach 2005). This effect also holds, but only among Asians, for neighbourhood deprivation, which might denote that neighbourhoods can also be 'poverty traps' for these groups. Similar results are found by Swisher, Kuhl, and Chavez (2013) for blacks and Hispanics in the US, as well as for studies in Sweden (van Ham et al. 2014) and France (McAvay 2018), where non-European second generation immigrants (non-Western Europeans, in the case of Sweden) are more likely to remain in areas with higher (co-)ethnic concentration and/or higher poverty, compared to majoritarian native populations. Among Caribbeans, and especially Africans, on the other hand, there is a weaker relationship between the deprivation levels of origin and destination neighbourhoods. This expresses a different type of disadvantage: even individuals raised in better-off areas have very low probabilities of avoiding areas with high deprivation.

This study has limitations, the most important one being the impossibility to actually measure the extent to which ethnic-specific explanations (such as discrimination or preferences for co-ethnics) play a role in neighbourhood attainment. Furthermore, while the inclusion of variables at different time points and levels (individual, household, neighbourhood) is one the strongest assets of this study, their number is limited, which implies that we might be overestimating the observed ethnic gaps. For example, we are not able to include direct

measures of income or wealth (Crowder, South, and Chavez 2006, Coulter and Clark 2018), known to have an effect on neighbourhood attainment. In addition, the ten-year interval between censuses means that we might potentially miss relevant information connected to individual socioeconomic and neighbourhood changes. At the same time, some of the variables we actually measure, such as education and social class, are probably capturing some of the observed origin neighbourhood effects (Urban 2009), which means that we might be underestimating the effect of this variable (however, this is inescapable to the design of the study). Finally, as argued before, this study does not take full consideration of the general patterns of segregation, housing availability, transport, geography, etc. that may condition residential changes. In an attempt to partly address this issue, using information on population density in origin, the article suggests that urban contexts might promote greater ethnic inequalities.

6 DISCUSSION

Findings from this study have direct implications for the understanding of ethnic minorities' spatial integration in the UK. The observed reduction in the ethnic gap or 'ethnic penalty' (Heath and Cheung 2007) in access to less concentrated and less deprived neighbourhoods among those with more socioeconomic and cultural resources is for sure an encouraging finding of this study. In a context where second generation ethnic minorities are increasingly obtaining university degrees (Crawford and Greaves 2015) and improving their occupational opportunities (Cheung and Heath 2007), the stronger effect of education and social class suggests some optimism regarding the benefits of these assets for these groups. It means that they are able to use them to better position themselves in their choice of a neighbourhood. However, except for Indians when studying neighbourhood deprivation, ethnic inequalities remain even among those with more resources. At the same time, those second generation ethnic minorities with low socioeconomic and cultural resources find themselves in a much

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more disadvantageous position with respect to white British individuals, especially as regards access to less deprived neighbourhoods. Of equal concern is the finding that, when considering neighbourhood change over time, some second generation ethnic minorities are more likely to remain 'trapped' in ethnically concentrated and deprived areas (Pakistanis and Bangladeshis in particular) or more often thrown to deprived neighbourhoods (Caribbeans and Africans). These results might lead to a reproduction of ethnic and social inequalities, and to an acceleration of the relationship between ethnic and social inequalities.

Ethnic spatial segregation, and its persistence over time, has been at the core of UK's government agenda (HM Government 2018). This has come hand in hand with increasing debates regarding (the failure of) multiculturalism (Rattansi 2011, Modood and Meer 2012) and the need to create a more cohesive society (Uslaner 2012). Of great importance in this debate has also been the evidence highlighting the potential worrisome consequences of ethnic spatial segregation and its link with neighbourhood deprivation[22] (Casey 2016, Cabinet Office 2017) – which can lead to an accumulation of different sources of inequality, as observed in this study. Following from these concerns, much of the emphasis of UK's policy agenda has been directed to promote equality of opportunities across different ethnic groups (Cabinet Office 2017) as well as to make neighbourhoods more integrated (HM Government 2018). However, in order to better develop long-term policies that seek to address these issues, there is a need to understand the long-term dynamics behind the production and reproduction of ethnic spatial inequalities; much in the same way that an effort has been made to understand the dynamics of ethnic penalties in the labour market (see e.g. reports from the Social Mobility Commission, such as Shaw et al. (2016)). This study, which uses longitudinal data to study second generation

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[22] The negative effects of neighbourhood deprivation on a series of outcomes, such as employment (Feng, Flowerdew, and Feng 2013) or mortality and health (Boyle, Norman, and Rees 2004) are well-known. Moreover, although the effect of ethnic concentration is more complex to assess, and depends greatly on the outcomes studied, research in the UK shows for example negative effects on Pakistanis and Bangladeshis' labour market outcomes (Clark and Drinkwater 2002, Khattab et al. 2010, Zuccotti and Platt 2017).

ethnic minorities' neighbourhood outcomes, has helped in this purpose. It shows that ethnic spatial segregation is, in part, the product of time-persisting ethnic inequalities in the access to neighbourhoods, and that and that these inequalities are conditioned both by childhood and by adult resources. More research is necessary to understand the role of preferences and constraints in these processes.

7   ACKNOWLEDGEMENTS

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9   TABLES

Table 1: Total number of Wards and average percentage of groups in Wards, by neighbourhood ethnic concentration in 2011

	Wards	White British	Non-white	Indian	Pakistani	Bangladeshi	Caribbean	African
Q1	7258	93.1	2.6	0.6	0.2	0.1	0.2	0.3
Q2	700	68.7	18.2	4.2	2.8	0.9	1.4	2.6
Q3	304	48.9	33.0	5.9	5.3	1.8	3.5	5.9
Q4	189	32.6	49.4	8.9	8.4	3.8	5.7	9.2
Q5	119	17.3	71.4	21.9	18.7	7.6	3.9	5.5

Source: Author's own calculations based on aggregated Census data for England and Wales (from www.neighbourhood.statistics.gov.uk).

Table 2: Neighbourhood deprivation by neighbourhood ethnic concentration, 2011 (row %)

Neighbourhood ethnic concentration	Neighbourhood deprivation					
	Q1	Q2	Q3	Q4	Q5	Total Wards
Q1	34.8	23.9	20.0	14.3	7.0	7253
Q2	9.9	21.3	23.1	26.5	19.2	694
Q3	2.3	5.3	11.2	33.6	47.7	304
Q4	2.7	1.1	4.3	12.8	79.3	188
Q5	0.0	0.0	5.0	10.1	84.9	119

Note: Q5 means more ethnic concentration population or more deprivation; differences in the number of Wards between Tables 1 and 2 are because deprivation scores were calculated only for Wards that have a minimum of 100 households.

Source: Author's own calculations based on aggregated Census data for England and Wales (from www.neighbourhood.statistics.gov.uk and data provided by Prof. Paul Norman).

Table 3: Individuals in neighbourhoods with low ethnic concentration and middle/low deprivation* in 2011, by ethnic group, education and social class in 2001, and origin neighbourhood** in 1971-1991. Percentages.

	White British	Indian	Pakistani	Bangladeshi	Caribbean	African
% in neighbourhoods with low ethnic concentration						
Education						
Level 1 or less	94.7	45.1	29.4	36.0	38.2	32.4
Level 4	93.3	55.5	46.3	33.8	47.2	51.2
Social class						
Manual	94.9	43.8	23.7	24.8	40.1	40.6
Service	94.5	54.2	44.1	41.1	48.1	41.4
Origin neighbourhood						
High ethnic concentration	76.5	40.6	23.1	20.7	35.8	30.6
Low ethnic concentration	95.8	71.8	61.1	67.2	59.6	60.5
% in neighbourhoods with middle/low deprivation						
Education						
Level 1 or less	83.8	54.9	38.0	37.0	46.1	38.2
Level 4	92.6	79.4	60.1	51.5	64.4	54.7
Social class						
Manual	82.5	50.4	33.7	33.1	45.1	40.6
Service	92.1	77.7	59.3	56.7	62.8	55.2
Origin neighbourhood						
High deprivation	74.0	59.2	37.4	34.3	47.8	50.8
Middle/low deprivation	90.4	80.6	66.3	71.7	59.7	54.7

* Low ethnic concentration comprise quintiles 1 and 2; middle/low deprivation comprise quintiles 1 to 4.

** Origin neighbourhoods with low and high ethnic concentration comprise quintiles 1 and 2, and quintiles 4 and 5 respectively (in the regression analysis I focus on those who lived in quintile 5; here I have pooled quintiles 4 and 5 due to ONS disclosure policies); origin neighbourhoods with middle/low and high deprivation comprise quintiles 1 to 4 and quintile 5, respectively.

N=156485 (white British), 2090 (Indian), 982 (Pakistani), 264 (Bangladeshi), 1187 (Caribbean) and 160 (African).

Population: Individuals between 30 and 55 years old (2011)

Source: Author's own calculations based on ONS-LS

Table 4: Probability of being in a neighbourhood with low ethnic concentration and middle/low deprivation* in 2011. Average Marginal Effects.

	Neighbourhood with low ethnic concentration		Neighbourhood with middle/low deprivation	
	Model 1	Model 2	Model 1	Model 2
Ethnic group (ref. white British)				
Indian	-0.128	-0.072	-0.081	-0.046
	(0.009)***	(0.007)***	(0.009)***	(0.009)***
Pakistani	-0.227	-0.146	-0.225	-0.148
	(0.016)***	(0.014)***	(0.017)***	(0.016)***
Bangladeshi	-0.226	-0.137	-0.225	-0.109
	(0.030)***	(0.023)***	(0.030)***	(0.024)***
Caribbean	-0.198	-0.125	-0.218	-0.125
	(0.014)***	(0.011)***	(0.016)***	(0.013)***
African	-0.173	-0.097	-0.234	-0.154
	(0.032)***	(0.024)***	(0.043)***	(0.036)***
N	161168	161168	161168	161168
Other controls				
Origin neighbourhood ethnic concentration	X	X		X
Origin neighbourhood deprivation		X	X	X
Household of origin characteristics[1]		X		X
Individual characteristics[2]		X		X

Note: All models control for age, gender, origin year, and number of census points.
[1] Tenure, number of persons per room, number of cars and parental social class.
[2] Education, social class, civil status and presence of children in the household.
* p-value<.05 ** p-value<.01 *** p-value<.001; robust (clustered) standard errors in parentheses
Population: Individuals between 30 and 55 years old (2011)
Source: Author's own calculations based on ONS-LS

Table 5: Distribution of ethnic groups (row %) in areas with different levels of population density (number of people per square km) in origin

	0-499	500-1999	2000-3999	4000 and more	Total
British	21.5	28.8	26.3	23.4	155,940
Indian	0.6	7.4	29.9	61.2	2,089
Pakistani	0.0	10.5	23.2	64.5	982
Bangladeshi	0.0	5.3	16.7	69.3	264
Caribbean	0.0	4.5	19.4	74.6	1,187
African	0.0	0.0	18.1	81.9	160

Population: Individuals between 30 and 55 years old (2011)
Source: Author's own calculations based on ONS-LS

Table 6: Probability of being in a neighbourhood with low ethnic concentration and middle/low deprivation* in 2011, with population density (number of people per square km) controls. Average Marginal Effects.

	Neighbourhood with low ethnic concentration			Neighbourhood with middle/low deprivation		
	Density 1	High density	Low density	Density 1	High density	Low density
Ethnic group (ref. white British)						
Indian	-0.073	-0.123	-0.071	-0.047	-0.067	-0.050
	(0.007)***	(0.013)***	(0.010)***	(0.009)***	(0.016)***	(0.012)***
Pakistani	-0.151	-0.216	-0.159	-0.151	-0.237	-0.104
	(0.014)***	(0.021)***	(0.022)***	(0.016)***	(0.025)***	(0.021)***
Bangladeshi	-0.137	-0.210	-0.105	-0.109	-0.179	-0.095
	(0.023)***	(0.035)***	(0.039)**	(0.024)***	(0.036)***	(0.042)*
Caribbean	-0.122	-0.199	-0.091	-0.120	-0.195	-0.066
	(0.010)***	(0.016)***	(0.017)***	(0.013)***	(0.019)***	(0.020)**
African	-0.090	-0.136	-0.257	-0.144	-0.231	-0.078
	(0.023)***	(0.031)***	(0.101)*	(0.034)***	(0.046)***	(0.073)
Population density in origin (ref. 0-499)						
500-1999	-0.008			-0.028		
	(0.002)***			(0.003)***		
2000-3999	-0.022			-0.066		
	(0.002)***			(0.003)***		
4000 and more	-0.037			-0.084		
	(0.002)***			(0.003)***		
N	160622	160622	160622	39691	39691	120931

Note: All models control for age, gender, origin year, number of census points, tenure, number of persons per room, number of cars, parental social class, education, social class, civil status and presence of children in the household.

* p-value<.05 ** p-value<.01 *** p-value<.001; robust (clustered) standard errors in parentheses

Population: Individuals between 30 and 55 years old (2011)

Source: Author's own calculations based on ONS-LS

10 FIGURES

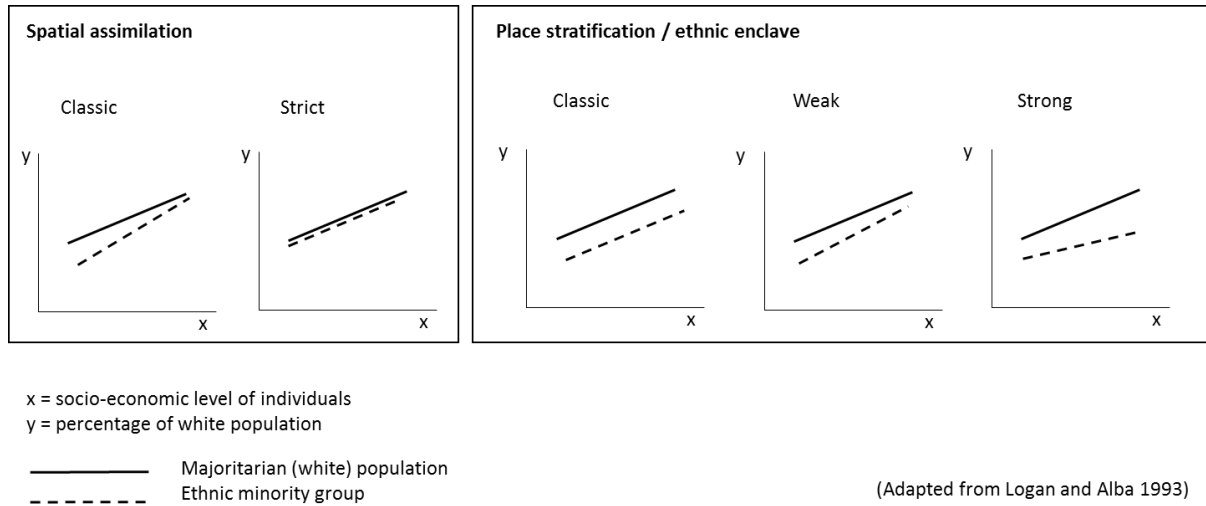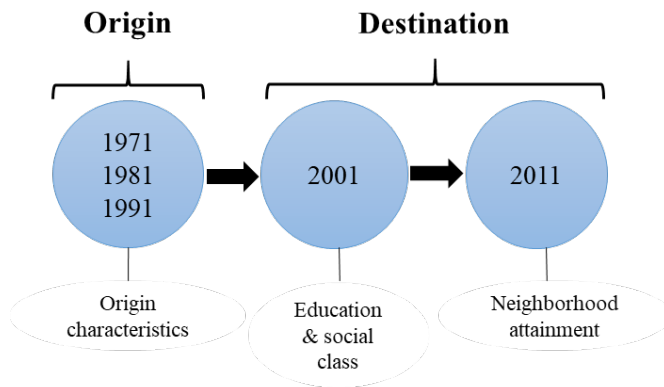**Figure 1: Models of neighbourhood attainment**

Spatial assimilation — Classic, Strict

Place stratification / ethnic enclave — Classic, Weak, Strong

x = socio-economic level of individuals
y = percentage of white population

———————— Majoritarian (white) population
- - - - - - - Ethnic minority group

(Adapted from Logan and Alba 1993)

Figure 2: Sample structure

Age structure of the sample:

1971	1981	1991	2001	2011
0-15			30-45	40-55
	0-15		20-35	30-45
		10-15	20-25	20-35

Figure 3: Individuals in neighbourhoods with low ethnic concentration and middle/low deprivation* in 2011, by ethnic group. Percentages.
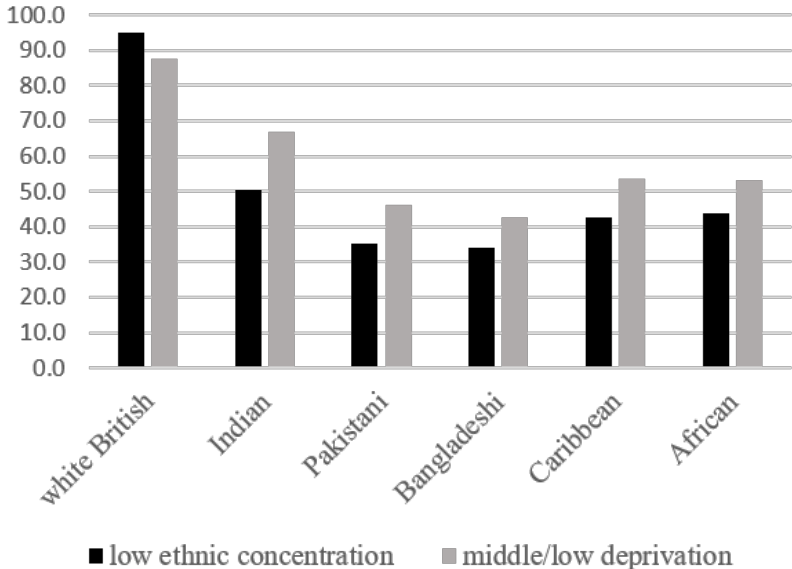
* Low ethnic concentration comprise quintiles 1 and 2; middle/low deprivation comprise quintiles 1 to 4.
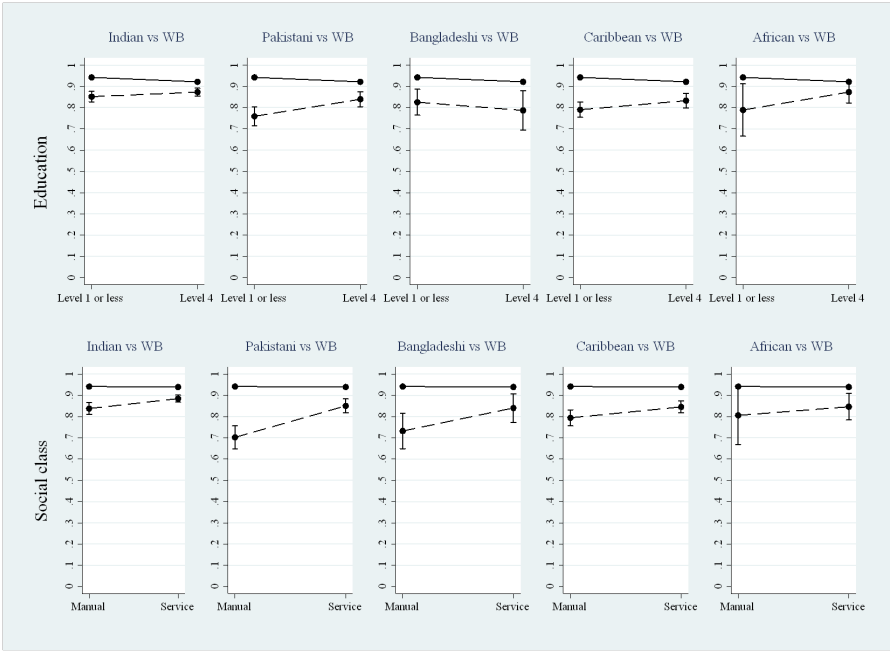Population: Individuals between 30 and 55 years old (2011)
Source: Author's own calculations based on ONS-LS
N=156485 (white British), 2090 (Indian), 982 (Pakistani), 264 (Bangladeshi), 1187 (Caribbean) and 160 (African).

Figure 4: The role of education and social class on the probability of being in a neighbourhood with *low* ethnic concentration and *middle/low* deprivation in 2011, for each ethnic minority group (dashed lines) in comparison with the white British (solid lines). Predicted values (95% CI).

Neighbourhood ethnic concentration
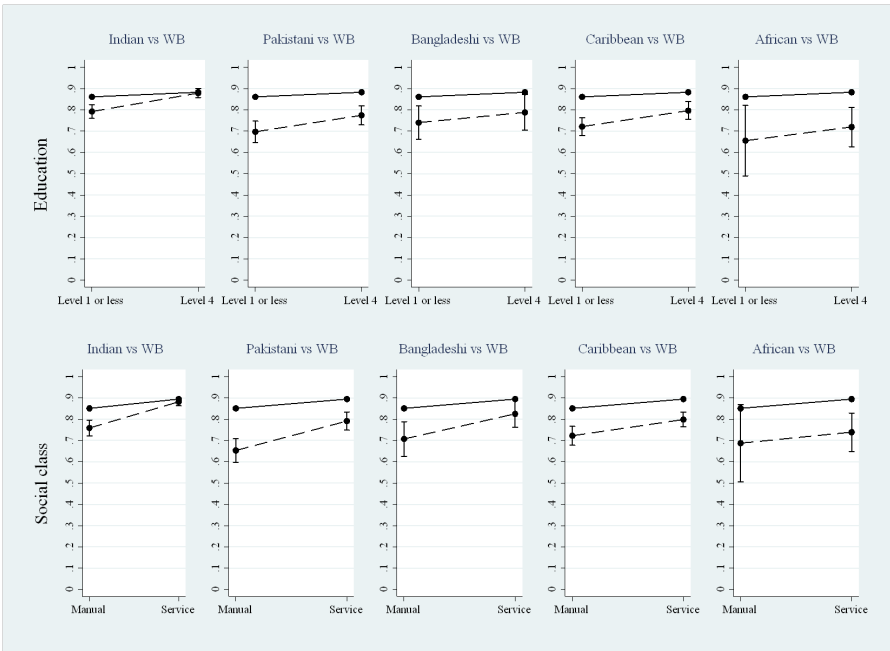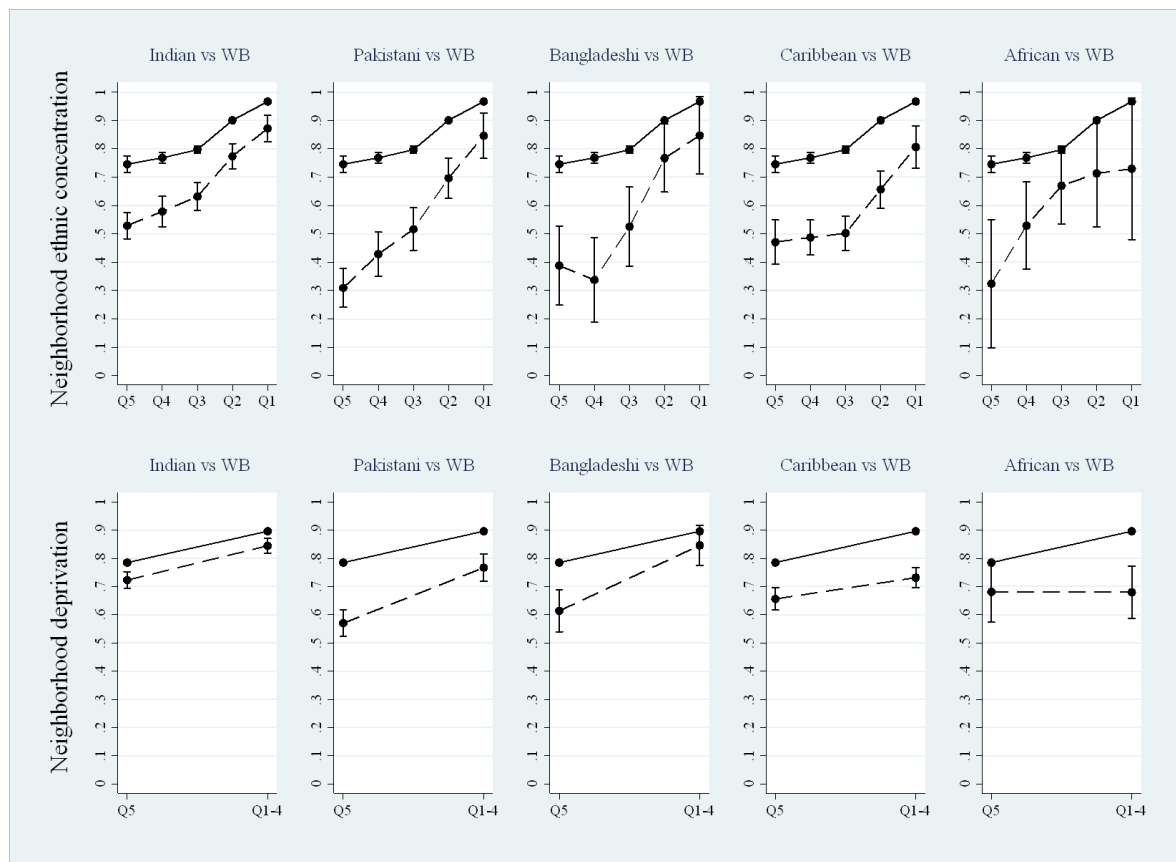

Neighbourhood deprivation

Note: Controls for age, gender, origin year, number of census points, origin neighbourhood ethnic concentration/origin neighbourhood deprivation, tenure, number of persons per room, number of cars, parental social class, civil status, presence of children in the household (and education/social class). Based on models with interactions.
Population: Individuals between 30 and 55 years old (2011)
Source: Author's own calculations based on ONS-LS

Figure 5: The role of origin neighbourhood on the probability of being in being in a neighbourhood with low ethnic concentration and middle/low deprivation in 2011, for each ethnic minority group (dashed lines) in comparison with the white British (solid lines). Predicted values (95% CI).

Note: Controls for age, gender, origin year, number of census points, origin neighbourhood ethnic concentration/deprivation, tenure, number of persons per room, number of cars, parental social class, education, social class, civil status, presence of children in the household. Based on models with interactions.
Population: Individuals between 30 and 55 years old (2011)
Source: Author's own calculations based on ONS-LS

Table A1: Neighborhood ethnic concentration by neighborhood ethnic-specific concentration (column %)

	Indian concentration					Pakistani concentration					Bangladeshi concentration					Caribbean concentration					African concentration				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Neighbourhood ethnic concentration (1981)																									
Q1	94.1	25.3	0.0	0.0	0.0	85.0	7.0	0.0	0.0	0.0	84.9	19.8	6.5	0.0	0.0	87.5	4.0	0.0	0.0	0.0	94.3	34.6	0.0	0.0	0.0
Q2	5.3	55.7	30.8	1.6	0.0	11.5	33.2	27.0	0.0	0.0	11.2	33.7	29.6	18.2	0.0	11.0	49.5	3.7	0.0	0.0	5.1	55.0	24.8	0.0	0.0
Q3	0.5	13.5	41.4	34.1	0.0	2.3	29.4	37.0	45.7	9.1	2.5	24.1	26.9	50.0	11.1	1.2	31.7	55.8	38.3	0.0	0.5	7.4	56.8	27.2	0.0
Q4	0.2	4.9	18.5	43.1	17.1	1.0	17.6	22.0	30.4	31.8	1.1	14.7	17.6	22.7	44.4	0.3	10.9	25.8	45.7	52.5	0.1	2.3	15.4	45.7	43.1
Q5	0.0	0.6	9.2	21.1	82.9	0.2	12.8	14.0	23.9	59.1	0.4	7.8	19.4	9.1	44.4	0.1	4.0	14.7	16.0	47.5	0.0	0.7	3.0	27.2	56.9
Wards	7684	1160	292	123	41	8819	313	100	46	22	8765	374	108	44	9	8580	404	163	94	59	7519	1241	331	151	58
Neighbourhood ethnic concentration (2011)																									
Q1	94.6	42.6	6.1	0.0	0.0	90.0	14.4	0.0	0.0	0.0	89.9	23.3	9.6	0.0	0.0	92.3	19.1	1.0	0.0	0.0	93.5	23.4	3.0	0.0	0.0
Q2	3.3	35.3	53.4	16.3	0.0	6.5	38.7	35.6	3.1	0.0	6.7	30.9	21.1	13.0	0.0	5.8	42.9	29.8	4.7	0.0	5.0	44.0	33.8	13.2	5.3
Q3	1.3	13.2	22.8	30.2	1.8	2.3	18.6	29.6	29.7	3.4	1.9	25.6	26.3	10.9	10.0	1.1	20.0	34.6	50.0	15.0	0.9	16.7	31.6	51.2	20.0
Q4	0.6	7.0	13.6	29.5	19.3	1.0	15.9	17.0	39.1	20.7	1.0	13.5	27.2	26.1	35.0	0.4	8.8	20.4	36.8	65.0	0.3	8.9	16.2	25.6	64.0
Q5	0.2	1.9	4.1	24.0	78.9	0.2	12.3	17.8	28.1	75.9	0.5	6.7	15.8	50.0	55.0	0.4	9.2	14.1	8.5	20.0	0.4	6.9	15.4	10.1	10.7
Wards	7303	787	294	129	57	8009	333	135	64	29	7944	446	114	46	20	7768	445	191	106	60	7628	504	234	129	75

Source: Author's own calculations based on aggregated census data for England and Wales.

Table A2: Probability of being in a neighborhood with low ethnic concentration and middle/low deprivation* in 2011. Average Marginal Effects; full models.

	Neighborhood ethnic concentration		Neighborhood deprivation	
	M1	**M2**	**M1**	**M2**
Ethnic group (ref. white British)				
Indian	-0.128	-0.072	-0.081	-0.046
	(0.009)***	(0.007)***	(0.009)***	(0.009)***
Pakistani	-0.227	-0.146	-0.225	-0.148
	(0.016)***	(0.014)***	(0.017)***	(0.016)***
Bangladeshi	-0.226	-0.137	-0.225	-0.109
	(0.030)***	(0.023)***	(0.030)***	(0.024)***
Caribbean	-0.198	-0.125	-0.218	-0.125
	(0.014)***	(0.011)***	(0.016)***	(0.013)***
African	-0.173	-0.097	-0.234	-0.154
	(0.032)***	(0.024)***	(0.043)***	(0.036)***
Origin neighborhood ethnic concentration (ref. quintile 1: lowest concentration)				
Quintile 2	-0.071	-0.069		-0.018
	(0.002)***	(0.002)***		(0.003)***
Quintile 3	-0.173	-0.170		-0.028
	(0.006)***	(0.006)***		(0.004)***
Quintile 4	-0.203	-0.201		-0.024
	(0.008)***	(0.008)***		(0.005)***
Quintile 5	-0.238	-0.234		-0.022
	(0.011)***	(0.011)***		(0.007)***
Origin neighborhood deprivation (ref. quintile 1: least deprived)				
Quintile 2		0.003	-0.019	-0.012
		(0.002)	(0.002)***	(0.002)***
Quintile 3		0.005	-0.033	-0.018
		(0.002)*	(0.002)***	(0.002)***
Quintile 4		0.009	-0.086	-0.058
		(0.002)***	(0.003)***	(0.003)***
Quintile 5		0.007	-0.201	-0.140
		(0.002)**	(0.003)***	(0.003)***
Tenure (ref. owner)				
Social rent		-0.009		-0.037
		(0.002)***		(0.002)***
Private rent		0.004		-0.007
		(0.002)*		(0.003)*
Number of cars (ref. none)				
1 car		0.010		0.038

	Neighborhood ethnic concentration		Neighborhood deprivation	
	M1	M2	M1	M2
		(0.002)***		(0.002)***
2+ cars		0.011		0.052
		(0.002)***		(0.003)***
Persons per room (ref. 1 ppp)				
> 1.5 persons		-0.008		-0.039
		(0.003)*		(0.005)***
1.5 persons		-0.014		-0.032
		(0.005)**		(0.007)***
>1 & <1.5 persons		-0.010		-0.016
		(0.002)***		(0.003)***
>= 0.75 & <1 person		0.004		0.009
		(0.002)*		(0.002)***
<0.75 person		0.001		0.014
		(0.002)		(0.002)***
Parental social class (ref. Manual (V+VI+VII))				
No earners/No code		-0.007		0.007
		(0.003)**		(0.003)
Routine non-manual (III)		-0.004		0.012
		(0.002)*		(0.002)***
Petit Bourgeoisie (IV)		0.003		0.029
		(0.002)		(0.003)***
Professional/Managerial (I+II)		-0.010		0.016
		(0.002)***		(0.003)***
Education (ref. Level 1 or less)				
Level 2+3		0.008		0.022
		(0.002)***		(0.002)***
Level 4		-0.015		0.026
		(0.002)***		(0.003)***
Respondent's social class (ref. Manual)				
Petit bourgeoisie		0.008		0.046
		(0.003)**		(0.004)***
Intermediate		0.001		0.033
		(0.002)		(0.003)***
Service		0.001		0.046
		(0.002)		(0.003)***
Civil status (ref. Single)				
White British partner		0.039		0.055
		(0.002)***		(0.002)***
Other partner		-0.015		0.013
		(0.004)***		(0.006)*

	Neighborhood ethnic concentration		Neighborhood deprivation	
	M1	**M2**	**M1**	**M2**
Children				
Has children		0.003		-0.008
		(0.002)		(0.002)***
Age				
Age in destination	-0.000	-0.001	0.000	-0.000
	(0.000)	(0.000)***	(0.000)	(0.000)
Gender				
Male	-0.002	-0.001	0.004	0.003
	(0.001)	(0.001)	(0.002)*	(0.002)
Origin year (ref. 1971)				
1981	0.001	-0.001	0.003	-0.009
	(0.001)	(0.001)	(0.001)	(0.001)***
1991	-0.014	-0.013	-0.011	-0.036
	(0.002)***	(0.002)***	(0.002)***	(0.003)***
Number of census points (ref. 3)				
4 census points	0.002	0.003	0.014	0.003
	(0.004)	(0.004)	(0.006)*	(0.005)
5 census points	0.013	0.009	0.029	0.011
	(0.004)**	(0.004)*	(0.006)***	(0.006)
Constant	0.750***	0.669***	0.755***	0.676***
	(0.0320)	(0.0402)	(0.0338)	(0.0402)
Adjusted R-squared	0.036	0.079	0.035	0.078
N	161168	161168	161168	161168

Robust (clustered) standard errors in parentheses
*** p<0.01 ** p<0.05 * p<0.1
Population: Individuals between 20 and 45 years old
Source: Author's own calculations based on ONS-LS

Table A3: Probability of being in a neighborhood with low ethnic concentration and middle/low deprivation* in 2011. Models with interactions (ethnic group and education/social class).

	Neighborhood ethnic concentration						Neighborhood deprivation					
	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|
Ethnic group (ref. white British)												
Indian	-1.174	0.117	0.000	-1.282	0.122	0.000	-0.540	0.116	0.000	-0.659	0.117	0.000
Pakistani	-1.870	0.146	0.000	-2.196	0.156	0.000	-1.112	0.139	0.000	-1.237	0.141	0.000
Bangladeshi	-1.400	0.249	0.000	-2.024	0.253	0.000	-0.869	0.236	0.000	-0.956	0.226	0.000
Caribbean	-1.663	0.129	0.000	-1.621	0.137	0.000	-0.978	0.122	0.000	-0.873	0.129	0.000
African	-1.674	0.439	0.000	-1.538	0.519	0.003	-1.330	0.428	0.002	-1.061	0.487	0.029
Origin neighborhood ethnic concentration (ref. Q1: lowest concentration)												
Q2	-1.177	0.031	0.000	-1.172	0.031	0.000	-0.174	0.025	0.000	-0.172	0.025	0.000
Q3	-2.012	0.042	0.000	-2.005	0.042	0.000	-0.259	0.038	0.000	-0.259	0.038	0.000
Q4	-2.205	0.052	0.000	-2.191	0.052	0.000	-0.226	0.048	0.000	-0.222	0.048	0.000
Q5	-2.371	0.064	0.000	-2.373	0.065	0.000	-0.205	0.058	0.000	-0.211	0.058	0.000
Carstairs quintile (ref. Q1: least deprived)												
Q2	0.044	0.039	0.259	0.045	0.039	0.240	-0.154	0.031	0.000	-0.153	0.031	0.000
Q3	0.094	0.040	0.019	0.098	0.040	0.014	-0.224	0.032	0.000	-0.223	0.032	0.000
Q4	0.156	0.040	0.000	0.161	0.040	0.000	-0.628	0.030	0.000	-0.627	0.030	0.000
Q5	0.132	0.042	0.002	0.129	0.042	0.002	-1.222	0.030	0.000	-1.222	0.030	0.000
Tenure (ref. owner)												
Social rent	-0.179	0.032	0.000	-0.176	0.032	0.000	-0.351	0.021	0.000	-0.351	0.021	0.000
Private rent	0.072	0.042	0.087	0.078	0.042	0.064	-0.077	0.030	0.010	-0.076	0.030	0.011
Number of cars (ref. none)												
1 car	0.181	0.029	0.000	0.184	0.029	0.000	0.355	0.019	0.000	0.355	0.019	0.000
2+ cars	0.206	0.043	0.000	0.204	0.043	0.000	0.508	0.033	0.000	0.507	0.033	0.000

	Neighborhood ethnic concentration						Neighborhood deprivation					
	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|
Persons per room (ref. 1 ppp)												
> 1.5 persons	-0.137	0.058	0.018	-0.150	0.058	0.010	-0.332	0.041	0.000	-0.338	0.041	0.000
1.5 persons	-0.243	0.083	0.003	-0.250	0.083	0.003	-0.277	0.057	0.000	-0.279	0.057	0.000
>1 & <1.5 persons	-0.174	0.040	0.000	-0.172	0.040	0.000	-0.144	0.027	0.000	-0.143	0.027	0.000
>= 0.75 & <1 person	0.080	0.034	0.019	0.077	0.034	0.023	0.086	0.023	0.000	0.085	0.023	0.000
<0.75 person	0.030	0.035	0.380	0.025	0.035	0.469	0.145	0.024	0.000	0.143	0.024	0.000
Parental social class (ref. Manual (V+VI+VII))												
Not codeable/No earners in hh	-0.124	0.048	0.009	-0.123	0.047	0.010	0.063	0.033	0.056	0.063	0.033	0.053
Routine non-manual (III)	-0.081	0.035	0.022	-0.074	0.035	0.036	0.116	0.024	0.000	0.117	0.024	0.000
Bourgeoisie (IV)	0.061	0.046	0.186	0.069	0.047	0.136	0.295	0.033	0.000	0.296	0.033	0.000
Professional/Managerial (I=II)	-0.190	0.035	0.000	-0.191	0.035	0.000	0.158	0.027	0.000	0.158	0.027	0.000
Education (ref. Level 1 or less)												
Level 2+3	0.182	0.036	0.000	0.169	0.034	0.000	0.218	0.024	0.000	0.212	0.023	0.000
Level 4+	-0.365	0.042	0.000	-0.269	0.040	0.000	0.212	0.034	0.000	0.244	0.033	0.000
Respondent's social class (ref. Manual)												
Petit bourgeoisie	0.167	0.061	0.006	0.100	0.063	0.112	0.451	0.043	0.000	0.441	0.044	0.000
Intermediate	0.013	0.042	0.751	-0.012	0.045	0.787	0.306	0.030	0.000	0.312	0.032	0.000
Service	0.026	0.036	0.470	-0.045	0.038	0.237	0.448	0.026	0.000	0.427	0.027	0.000
Civil status (ref. Single)												
White British partner	0.738	0.031	0.000	0.740	0.031	0.000	0.519	0.022	0.000	0.519	0.022	0.000
Other partner	-0.168	0.058	0.004	-0.200	0.058	0.001	0.128	0.054	0.018	0.111	0.053	0.038
Has children	0.065	0.032	0.044	0.061	0.032	0.056	-0.081	0.022	0.000	-0.082	0.022	0.000

	Neighborhood ethnic concentration						Neighborhood deprivation					
	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|
Age	-0.011	0.003	0.000	-0.011	0.003	0.000	-0.003	0.002	0.096	-0.004	0.002	0.086
Male	-0.016	0.028	0.580	-0.012	0.029	0.670	0.025	0.020	0.210	0.027	0.020	0.182
Number of census points (ref. 3)												
4	0.040	0.067	0.551	0.038	0.068	0.574	0.022	0.052	0.664	0.022	0.052	0.666
5	0.152	0.073	0.036	0.152	0.073	0.037	0.101	0.055	0.067	0.102	0.055	0.064
Origin year (ref. 1971)												
1981	-0.019	0.021	0.377	-0.020	0.021	0.361	-0.092	0.014	0.000	-0.093	0.014	0.000
1991	-0.243	0.034	0.000	-0.245	0.034	0.000	-0.334	0.023	0.000	-0.334	0.023	0.000
Interactions ethnic group*Education												
Indian*Level 2+3	-0.158	0.152	0.298				-0.130	0.152	0.392			
Indian*Level 4+	0.570	0.145	0.000				0.499	0.153	0.001			
Pakistani*Level 2+3	-0.210	0.214	0.327				-0.158	0.203	0.435			
Pakistani*Level 4+	0.950	0.203	0.000				0.242	0.197	0.218			
Bangladeshi*Level 2+3	-0.504	0.373	0.176				-0.015	0.336	0.965			
Bangladeshi*Level 4+	0.079	0.406	0.845				0.090	0.368	0.807			
Caribbean*Level 2+3	0.038	0.187	0.839				-0.094	0.178	0.600			
Caribbean*Level 4+	0.689	0.193	0.000				0.255	0.188	0.176			
African*Level 2+3	-0.412	0.620	0.507				0.648	0.620	0.296			
African*Level 4+	1.071	0.513	0.037				0.131	0.503	0.795			
Interactions ethnic group*social class												
Indian*Petit bourgeoisie				0.409	0.263	0.121				0.078	0.270	0.774
Indian*Intermediate				0.241	0.182	0.186				0.182	0.181	0.313
Indian*Service				0.496	0.143	0.001				0.521	0.146	0.000
Pakistani*Petit bourgeoisie				1.488	0.296	0.000				0.546	0.292	0.061
Pakistani*Intermediate				0.334	0.259	0.196				-0.067	0.240	0.779

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	Neighborhood ethnic concentration						Neighborhood deprivation					
	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|	B	SE	P>|z|
Pakistani*Service				1.069	0.210	0.000				0.359	0.196	0.068
Bangladeshi*Petit bourgeoisie				0.898	0.574	0.118				0.704	0.575	0.221
Bangladeshi*Intermediate				0.882	0.463	0.057				-0.372	0.473	0.431
Bangladeshi*Service				0.811	0.385	0.035				0.320	0.332	0.335
Caribbean*Petit bourgeoisie				-0.726	0.458	0.113				-0.525	0.383	0.171
Caribbean*Intermediate				0.082	0.216	0.705				-0.258	0.204	0.208
Caribbean*Service				0.450	0.183	0.014				0.044	0.175	0.801
African*Petit bourgeoisie				0.909	1.041	0.383				0.179	1.076	0.868
African*Intermediate				0.461	0.672	0.493				0.137	0.639	0.831
African*Service				0.373	0.589	0.527				-0.143	0.554	0.796
Constant	3.183	0.118	0.000	3.198	0.118	0.000	1.767	0.086	0.000	1.772	0.086	0.000
N	161168			161168			161168			161168		

B-coefficients, robust (clustered) standard errors and p-values
Population: Individuals between 20 and 45 years old
Source: Author's own calculations based on ONS-LS

Table A4: Probability of being in a neighborhood with low ethnic concentration and middle/low deprivation* in 2011. Models with interactions (ethnic group and origin neighborhood).

	Neighborhood ethnic concentration			Neighborhood deprivation		
	B	**SE**	**P>|z|**	**B**	**SE**	**P>|z|**
Ethnic group (ref. white British)						
Indian	-1.007	0.125	0.000	-0.362	0.083	0.000
Pakistani	-1.974	0.186	0.000	-1.103	0.108	0.000
Bangladeshi	-1.610	0.323	0.000	-0.904	0.176	0.000
Caribbean	-1.253	0.183	0.000	-0.704	0.099	0.000
African	-1.901	0.557	0.001	-0.581	0.277	0.036
Origin neighborhood ethnic concentration (ref. Q1: lowest concentration)						
Q2	0.127	0.091	0.164	-0.173	0.025	0.000
Q3	0.302	0.087	0.001	-0.322	0.038	0.000
Q4	1.165	0.086	0.000	-0.286	0.048	0.000
Q5	2.345	0.084	0.000	-0.259	0.060	0.000
Carstairs quintile (ref. Q1: least deprived)						
Q2	0.048	0.039	0.213			
Q3	0.103	0.040	0.010			
Q4	0.165	0.040	0.000			
Q5	0.134	0.042	0.001			
Carstairs quintile (ref. Q5: most deprived)						
Q1-4				0.913	0.020	0.000
Tenure (ref. owner)						
Social rent	-0.156	0.032	0.000	-0.336	0.021	0.000
Private rent	0.092	0.042	0.030	-0.045	0.030	0.131
Number of cars (ref. none)						
1 car	0.185	0.029	0.000	0.390	0.019	0.000

	Neighborhood ethnic concentration			Neighborhood deprivation		
	B	SE	P>|z|	B	SE	P>|z|
2+ cars	0.204	0.043	0.000	0.596	0.033	0.000
Persons per room (ref. 1 ppp)						
> 1.5 persons	-0.162	0.058	0.005	-0.333	0.041	0.000
1.5 persons	-0.258	0.082	0.002	-0.283	0.057	0.000
>1 & <1.5 persons	-0.178	0.039	0.000	-0.147	0.027	0.000
>= 0.75 & <1 person	0.074	0.034	0.030	0.092	0.023	0.000
<0.75 person	0.019	0.035	0.579	0.164	0.024	0.000
Parental social class (ref. Manual (V+VI+VII))						
Not codeable/No earners in hh	-0.124	0.047	0.009	0.063	0.033	0.056
Routine non-manual (III)	-0.072	0.035	0.041	0.128	0.024	0.000
Bourgeoisie (IV)	0.075	0.047	0.105	0.314	0.033	0.000
Professional/Managerial (I=II)	-0.194	0.035	0.000	0.201	0.027	0.000
Education (ref. Level 1 or less)						
Level 2+3	0.165	0.033	0.000	0.211	0.023	0.000
Level 4+	-0.264	0.040	0.000	0.258	0.033	0.000
Respondent's social class (ref. Manual)						
Petit bourgeoisie	0.165	0.060	0.006	0.458	0.043	0.000
Intermediate	0.011	0.042	0.785	0.314	0.030	0.000
Service	0.027	0.036	0.451	0.459	0.026	0.000
Civil status (ref. Single)						
White British partner	0.736	0.031	0.000	0.514	0.022	0.000
Other partner	-0.211	0.057	0.000	0.118	0.053	0.026
Has children	0.061	0.032	0.056	-0.091	0.022	0.000
Age	-0.011	0.003	0.000	-0.003	0.002	0.107
Male	-0.015	0.028	0.602	0.027	0.020	0.185

	Neighborhood ethnic concentration			Neighborhood deprivation		
	B	SE	P>|z|	B	SE	P>|z|
Number of census points (ref. 3)						
4	0.059	0.067	0.373	0.027	0.051	0.604
5	0.172	0.072	0.017	0.103	0.055	0.059
Origin year (ref. 1971)						
1981	-0.017	0.021	0.432	-0.119	0.014	0.000
1991	-0.242	0.034	0.000	-0.372	0.023	0.000
Interactions ethnic group*origin neighborhood ethnic concentration						
Indian*quintile 2	0.084	0.164	0.608			
Indian*quintile 3	0.142	0.163	0.385			
Indian*quintile 4	0.003	0.178	0.986			
Indian*quintile 5	-0.469	0.246	0.056			
Pakistani*quintile 2	0.413	0.237	0.081			
Pakistani*quintile 3	0.610	0.239	0.011			
Pakistani*quintile 4	0.553	0.253	0.029			
Pakistani*quintile 5	0.278	0.366	0.446			
Bangladeshi*quintile 2	-0.358	0.472	0.449			
Bangladeshi*quintile 3	0.286	0.427	0.504			
Bangladeshi*quintile 4	0.565	0.464	0.223			
Bangladeshi*quintile 5	-0.075	0.639	0.906			
Caribbean*quintile 2	-0.059	0.225	0.793			
Caribbean*quintile 3	-0.171	0.223	0.444			
Caribbean*quintile 4	-0.359	0.238	0.132			
Caribbean*quintile 5	-0.728	0.310	0.019			
Black African*quintile 2	0.767	0.628	0.222			
Black African*quintile 3	1.213	0.640	0.058			
Black African*quintile 4	0.565	0.744	0.448			

	Neighborhood ethnic concentration			Neighborhood deprivation		
	B	SE	P>|z|	B	SE	P>|z|
Black African*quintile 5	-0.531	0.874	0.544			
Interactions ethnic group*neighborhood deprivation						
Indian*quintile 1-4				-0.126	0.123	0.305
Pakistani*quintile 1-4				0.079	0.169	0.640
Bangladeshi*quintile 1-4				0.427	0.335	0.202
Caribbean*quintile 1-4				-0.524	0.126	0.000
African*quintile 1-4				-0.920	0.338	0.007
Constant	0.797	0.144	0.000	0.518	0.084	0.000
N	161168			161168		

B-coefficients, robust (clustered) standard errors and p-values

Population: Individuals between 20 and 45 years old

Source: Author's own calculations based on ONS-LS

Table A5: Distribution of individuals according to population density (number of people per square km) and neighbourhood ethnic concentration in origin (row %)

	0-499	500-1999	2000-3999	4000 and more	Total
Q1	25.1	32.1	25.3	17.5	125701
Q2	8.4	19.5	34.0	38.1	22247
Q3	0.7	7.1	26.5	65.7	6635
Q4	0.0	2.6	18.4	79.0	3622
Q5 (more concentration)	0.0	0.0	17.8	82.2	2395

Population: Individuals between 30 and 55 years old (2011)
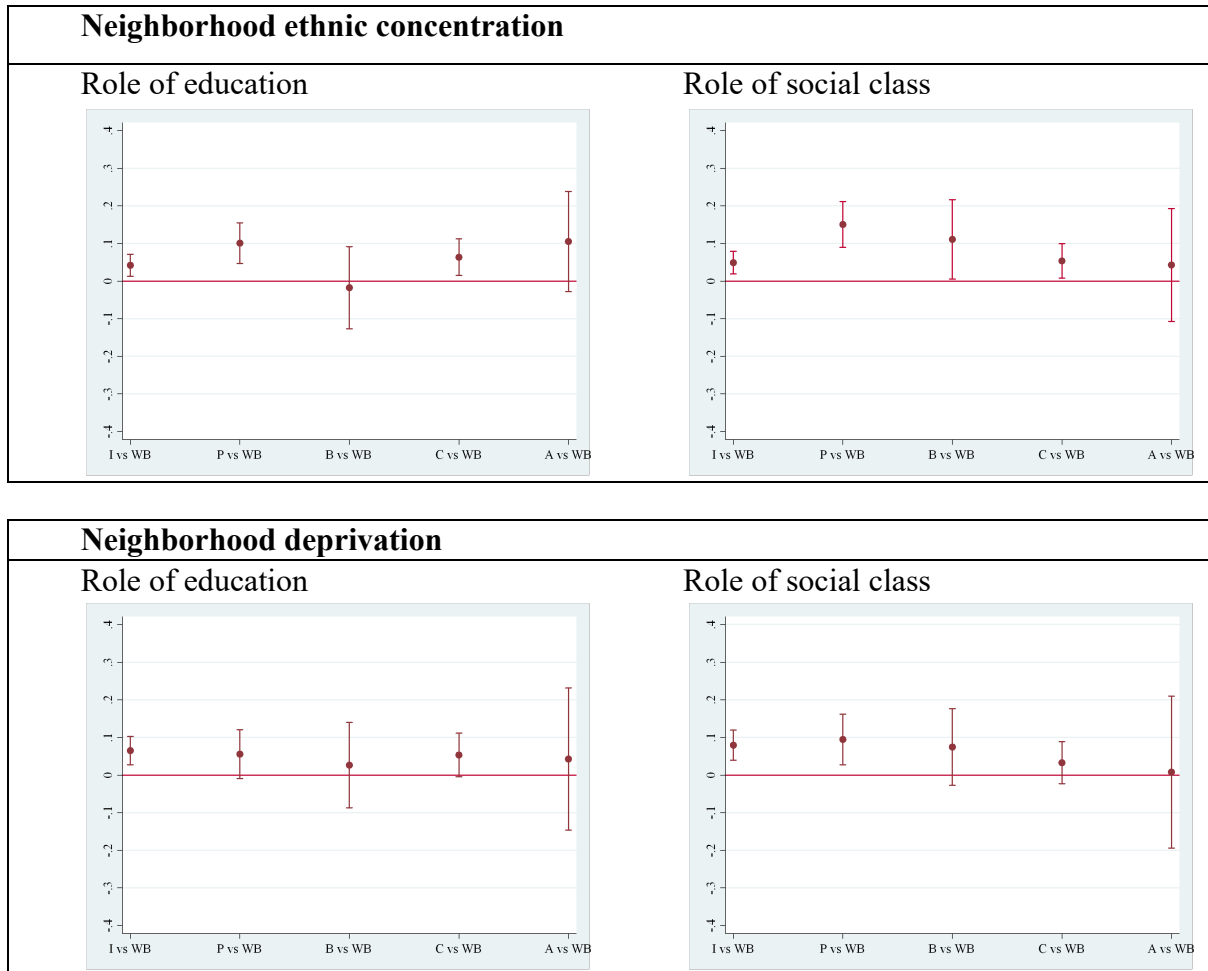Source: Author's own calculations based on ONS-LS

Table A6: Distribution of individuals according to population density (number of people per square km) and neighbourhood deprivation in origin (row %)

	0-499	500-1999	2000-3999	4000 and more	Total
Q1	36.6	32.9	21.2	9.3	33,317
Q2	29.8	29.3	23.3	17.7	33,939
Q3	19.0	29.8	29.0	22.2	32,741
Q4	10.1	29.5	29.5	30.9	31,934
Q5 (more deprivation)	6.2	17.9	29.0	47.0	28,691

Population: Individuals between 30 and 55 years old (2011)
Source: Author's own calculations based on ONS-LS

Figure A1: Contrasts* showing the role of education and social class

Neighborhood ethnic concentration

Role of education — Role of social class

Neighborhood deprivation
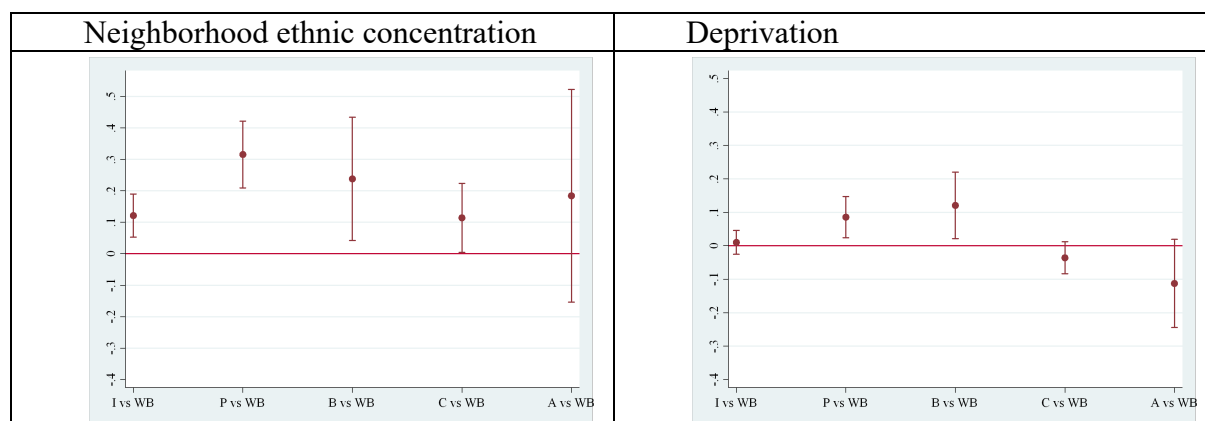
Role of education — Role of social class

Population: Individuals between 20 and 45 years old

Source: Author's own calculations based on ONS-LS

WB=white British; I=Indian; P=Pakistani; B=Bangladeshi; C=Caribbean; A=African   .

*When confidence intervals do not cross the zero line, it means that the effect of education/social class on the outcome variable is different between the groups compared at a p-value<0.05.

Figure A2: Contrasts* showing the role of origin neighborhood

| Neighborhood ethnic concentration | Deprivation |

Population: Individuals between 20 and 45 years old

Source: Author's own calculations based on ONS-LS

WB=white British; I=Indian; P=Pakistani; B=Bangladeshi; C=Caribbean; A=African   .

*When confidence intervals do not cross the zero line, it means that the effect of education/social class on the outcome variable is different between the groups compared at a p-value<0.05.