

Ethnic Differentials in Health: the Additional Effect of Ethnic Density

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ABSTRACT

It is well established that there are differentials in health among individuals of different Black and Minority Ethnic (BME) heritage. BME communities are unevenly concentrated across England and Wales. This paper examines the effect of residential density of one's own-ethnic group on physical health outcomes in England and Wales. In addition, it explores whether the effects of ethnic density on physical health outcomes are concealed by area deprivation and whether individual economic deprivation and area deprivation play a role in this relationship. Data on BME and White British individuals from the first wave of the UK Household Longitudinal Study (Understanding Society) are linked with ethnic density characteristics from the 2011 UK Census and with the Index of Multiple Deprivation from the 2010 English and Welsh Governments. Multilevel logistic regression is then employed in the analysis. The results show that individuals from BME groups who live in areas with a high density of their own-ethnic group are more likely to report poor health, but these effects are mediated by both individual economic deprivation and area deprivation. The results highlight that facilitating the improvement of economic and social conditions for individuals in deprived areas could help reduce the negative differentials in health outcomes experienced by individuals from BME communities. © 2016 The Authors Population, Space and Place Published by John Wiley & Sons, Ltd

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INTRODUCTION

In 2011, the ethnic minorities' (non-White) population in England and Wales had risen to 7 million from 3 million in 1991, accounting for 14% of the total population (Jivraj, 2012). However, people of Black and Minority Ethnic (BME) are unevenly concentrated across England and Wales (Clark & Drinkwater, 2002; Simpson & Finney, 2009), and areas of high ethnic population density are associated with a high level of area deprivation (Feng *et al.*, 2016). Studies using the Census data (1991, 2001, or 2011) have shown that ethnic diversity has spread out from urban centres towards areas that were traditionally less diverse (Catney, 2015) and ethnic minority groups have become increasingly concentrated in the most economically disadvantaged areas and deprived areas (Jivraj & Khan, 2013; Harris *et al.*, 2015). Health inequalities between BME and White British individuals have been well documented in the UK (e.g. DH, 2009), with individuals from BME groups generally more likely to report poor general health than the White British population (Karlsen & Nazroo, 2010). Against this context, the study of the relationship between ethnic density and health outcomes for individuals from ethnic communities at the neighbourhood level has direct relevance for understanding health inequalities not only between individuals from BME communities and White British individuals but also between individuals from different BME groups (Pickett & Wilkinson, 2008).

The advantages and disadvantages of high ethnic density have been debated extensively in relation to the health of ethnic minority groups (Pickett & Wilkinson, 2008; Becares *et al.*, 2012a).

On the one hand, enhanced social cohesion, mutual social support, and a stronger sense of community and belongingness in areas with a high density of individuals from one's own BME group could provide direct or indirect protective or so-called 'buffering' effects for one's health (Becares *et al.*, 2012a). On the other hand, a high concentration of individuals from BME groups tends to be associated with a lack of collective material and social resources in economically disadvantaged neighbourhoods (area deprivation), which could in turn increase the risk of poor health for individuals from BME groups (Pickett & Wilkinson, 2008; Zhang *et al.*, 2013). Previous studies examining the relationship between ethnic density and health outcomes for ethnic minorities in the UK have tended to focus either on the relationship between ethnic density and health (mainly mental health) (Pickett & Wilkinson, 2008; Becares & Nazroo, 2013) or on the effect of area deprivation on health (Becares *et al.*, 2012a). However, a more systematic analysis of the associations between ethnic density, area deprivation, and physical health in the UK has been lacking. It is important to explore such associations as it has been suggested that area deprivation may have a twofold role in concealing the effects of ethnic density by, firstly, negating the protective effects of ethnic density on individuals' health and, secondly, by complicating analytical attempts to disentangle the harmful impact of deprivation from the protective effects and benefits of ethnic density (Becares *et al.*, 2014). Therefore, the aim of this paper is to explore the associations between ethnic density, area deprivation, and physical health among individuals from BME communities compared with White British individuals. This paper also investigates whether the effect of own-ethnic density and area deprivation on physical health varies across different BME groups.

Ethnic Density and Ethnic Differentials in Health

Ethnic density is a measure of the concentration of one's own-ethnic group in the population, or an indicator of ethnic clustering. A common origin of ethnic clustering in the UK relates to the disadvantage in economic resources experienced by many members of BME communities, which can prevent them from buying or renting properties in a spatially structured housing market, resulting

in persons from certain BME groups concentrating in particular areas (Johnston *et al.*, 2014). On the other hand, where individuals from BME communities can afford to access properties at similar prices elsewhere, their preference to live in areas where many of their co-ethnic individuals are already concentrated, for cultural reasons, is another driver of ethnic clustering (Johnston *et al.*, 2014).

Existing research has found that individuals from BME groups in areas with high own-ethnic density can rely on higher levels of social support from social networks and supportive communities (Becares & Nazroo, 2013), avoid exposure to racism (Becares *et al.*, 2009), and report healthier behaviours, such as lower alcohol consumption (Becares *et al.*, 2011). These advantages present a protective effect for the health of individuals from BME groups, which has resulted in the so-called 'ethnic density hypothesis', assuming that individuals from BME groups report better health when living in areas with a higher own-ethnic group concentration (Pickett & Wilkinson, 2008; Becares *et al.*, 2012a; Becares & Nazroo, 2013). Such an association has been found to be present when exploring mental health outcomes (Pickett & Wilkinson, 2008; Becares *et al.*, 2009; Das-Munshi *et al.*, 2010; Shaw *et al.*, 2012; Becares & Nazroo, 2013).

By contrast, studies that have focused on physical health outcomes have produced mixed results in terms of their support for the 'ethnic density hypothesis'. Karlsen *et al.* (2002) and Becares *et al.* (2009) found no association between ethnic density and self-rated health, while Stafford *et al.* (2009) reported that a continuous measure of own-ethnic density is associated with a trend towards increased odds of reporting a limiting long-standing illness (LLSI). Drawing on such results, Stafford *et al.* (2009) argued that ethnic density may be protective for certain health outcomes (e.g. mental health) but not for others (e.g. the report of an LLSI). This research also suggested that residual confounding by deprivation may provide an explanation for the lack of an association between ethnic density and the report of an LLSI. Overall, the evidence for the 'ethnic density hypothesis' is more consistent for mental health outcomes than for physical health outcomes (Pickett & Wilkinson, 2008), and the study of the association between ethnic density and physical health outcomes in the UK remains a relatively under-researched area (Becares *et al.*, 2012a).

The Associations Between Ethnic Densities, Area Deprivation, and Physical Health

Areas of high ethnic population density are highly associated with a high level of area deprivation (Feng *et al.*, 2016), and existing studies show that ethnic minorities are more likely to live in more deprived areas (Jivraj & Khan, 2013; Harris *et al.*, 2015). In highly deprived areas, individuals may have fewer opportunities to benefit from collective material and social resources, such as public services, recreation facilities, job opportunities, and social support, which could increase the risk of poor health (Pickett & Wilkinson, 2008; Zhang *et al.*, 2013). However, the adverse association between area deprivation and health, and the protective effect of ethnic density on health might be argued to be operating in opposite directions for ethnic groups in the UK. Work by Becares *et al.* (2014) has suggested that area deprivation could, on the one hand, negate the protective effects of ethnic density and also complicate efforts to distinguish between the harmful effects of deprivation and the protective benefits of ethnic density. Although Becares *et al.* (2012b) found that there is a detrimental association between area deprivation and self-rated health for both White British and individuals from BME groups in England and that such association was not mediated by ethnic density effects, nevertheless, the focus of past research has been on the effects of area deprivation rather than on the effects of ethnic density on physical health outcomes. As a result, the interactions between ethnic density, area deprivation, and physical health in the UK remain under-researched.

Geography matters. The geography scales, which are used to reflect the characteristics of a neighbourhood, are an important limitation in most previous studies investigating this issue in the UK, as the majority have used geography scales larger than the Middle Super Output Area (including an average population of 7,200 individuals) with some even focussing on Government Office Region (Darlington *et al.*, 2015). Darlington *et al.* (2015) highlighted the importance of exploring the interaction between socio-economic and spatial differences and ethnicity to explain ethnic health gradients and point to the need for analysis at a lower spatial scale. Stafford *et al.* (2009) have suggested that the Middle Super Output Area is not an appropriate boundary to reflect residents'

movements, actual experiences, social interactions, and everyday lives at the neighbourhood level. Indeed, it is generally held that lower-level geographies are better at representing neighbourhoods (van Ham & Manley, 2010) and may be more suitable for analysis on ethnic minority populations because of the tendency for such groups to be geographical concentrated (Feng *et al.*, 2016).

Given the unclear associations between ethnic density, area deprivation, and physical health, as well as the higher-level geography scales used in previous studies, the aim of this paper is to provide a more precise understanding of such associations among individuals from BME groups and White British individuals. By using the Lower Layer Super Output Area (LSOA) as the neighbourhood level, including a minimum population of 1,000 individuals, the paper investigates whether the effect of own-ethnic density and area deprivation on physical health varies across different ethnic groups. The analysis focuses on two physical health outcomes: self-rated health and the extent to which one's health limits one's ability to undertake typical activities. The choice of these two indicators relates to the fact that they reflect different aspects of health and, together, can provide a more holistic picture of individuals' self-perceived health status (Manor *et al.*, 2001).

DATA AND METHODS

Data

The analysis uses the first wave (January 2009 to March 2011) of the UK Household Longitudinal Study (Understanding Society, UKHLS) data set, which is a national survey including an Ethnic Minority Boost Sample, designed to include at least 1,000 individuals from five ethnic groups: Indian, Pakistani, Bangladeshi, Caribbean, and African. Household addresses were randomly selected from the Postcode Address File in Great Britain. There are 36,178 respondents with complete information in this data set, of whom 5,485 came from individuals in England and Wales from the five ethnic groups. The response rates for the General Population and Ethnic Minority Boost sample were 82% and 73%, respectively (Boreham *et al.*, 2012). The respondents' home addresses are linked to local area data from the 2011 Census and the Department for Communities and Local

Government in England and Wales in order to allow for the inclusion of area effects in the analysis, as detailed in the next section.

Health Outcomes

Two physical health outcomes are examined: self-reported health and the extent to which one's health limits one's typical daily activities. Self-rated health is a sensitive and reliable indicator of general health status; it has also been shown to be a particularly valid measure for investigating ethnic differences in health (Chandola & Jenkinson, 2000) and is widely used in literature on health inequalities among ethnic minorities (i.e. Becares *et al.*, 2012b; Darlington *et al.*, 2015). There are five categories of self-reported health: excellent, very good, good, fair, or poor, which have been recoded into a binary outcome for ease of comparability with previous studies – 0 for excellent, very good, good, or fair health, and 1 for poor health. The response categories for whether one's health limits one's typical daily activities have been merged into a binary indicator: 0 representing no limitation at all and 1 representing at least some limitation.

Independent Variables

The independent variables include both individual-level and neighbourhood-level variables. *Ethnicity* is the key, self-reported variable. In this study, the ethnic groups are as follows: White British, Irish, Other White, Mixed, Indian, Pakistani, Bangladeshi, Other Asian, Caribbean, African, and any 'Other' ethnic groups. In addition to ethnicity, the analysis includes *age* and *gender* as demographic characteristics, along with total individual gross monthly *income* (recoded into categories by quintiles, which have been population weighted) and an individual-level measure of *deprivation* as two key socio-economic status variables. The individual-level measure of deprivation summarises the experience of deprivation from 8 question items from the individual questionnaire and 16 question items from the household questionnaire in the UKHLS data set according to the construction of a deprivation index by Berthoud and Bryan (2011). This combined variable has been recoded into categories by quintiles (from highest to lowest experience of deprivation), which are population weighted.

In terms of the LSOA level of analysis, this is designed by the Office of National Statistics for the collection and publication of small area statistics. There are 34,753 LSOAs in England and Wales, with a minimum population of 1,000 persons and an average population of 1,614 persons. Own-ethnic density and neighbourhood-level deprivation are two neighbourhood level variables in this study. *Own-ethnic density* was calculated from 2011 Census data for each LSOA, with the number of residents from an ethnic group in the area divided by the total population of the area; this is calculated for all individuals who are from each of the BME groups and for individuals who are White British. Taking into account the distribution of ethnic density across the BME groups, six dummy variables are then constructed in order to test for ethnic density: five own-ethnic concentration dummies (0–4.9%, 5–9.9%, 10–19.9%, 20–49.9%, and 50% plus) and one dummy representing White British individuals. Although ethnic density tends to be higher for some ethnic groups compared with others (Jivraj & Khan, 2013), the analysis in this paper was conducted with the same categories of ethnic density for all BME groups in order to produce comparable results. *Neighbourhood-level deprivation* was estimated using the Index of Multiple Deprivation (IMD) (Department for Communities and Local Government, 2011; Welsh Government, 2011). The IMD is a measure of multiple deprivation based on a weighted cumulative model of seven dimensions of deprivation at the neighbourhood level, namely, income, employment, health, education, barriers to housing and services, crime, and living environment. Neighbourhoods with a higher IMD score reflect areas with higher deprivation.

Multilevel logistic regression models are applied to estimate the impact of individual and neighbourhood factors simultaneously (Hox, 2002). All the models were estimated by the MLWIN 2.34 software (Rasbash *et al.*, 2009). In order to explore whether the effect of own-ethnic density on physical health was being mediated by individual and neighbourhood factors, the model-building process includes five models. Model 1 only includes demographic characteristics (age, gender, and ethnicity) and provides a general view of ethnic differentials in health; model 2 adds own-ethnic density in the analysis in order to examine its effect on health; model 3 includes individual

income, and model 4 adds individual deprivation to explore whether individual socio-economic status could potentially mediate the ethnic density effects; finally, model 5 adds the factor of IMD in order to investigate whether the ethnic density effect is mediated by neighbourhood deprivation.

RESULTS

Table 1 presents descriptive information of the health outcomes and independent variables. Apart from individuals from Pakistani groups, the distribution of reports of poor self-rated health was similar across other ethnic groups (less than 10%); Pakistani persons were the most likely to report poor self-rated health (11.6%) compared with only 3% of Other White persons. There are variances in the extent to which one's health limits one's typical activities across ethnic groups; Pakistani individuals were again the most likely to report that their health limits their typical activities (26.2%), while African and Other White individuals were the least likely (12.5% and 12.7%, respectively). More than 20% of Irish, Indian, Bangladeshi, Caribbean persons, and persons of any Other ethnic group reported that their health limits their typical activities. In terms of demographic characteristics, White British and Irish respondents tended to be older, while Pakistani, Bangladeshi, and African respondents tended to be younger. In order to have a clear view of the socio-economic status among ethnic groups, Figures 1 and 2 show the proportion of BME individuals within each quintile group of the income distribution and the individual deprivation distribution; the distribution of the (majority) White British and Irish populations are also shown as a comparator. More than 37% of Pakistani and Bangladeshi persons are located in the poorest fifth of the income distribution compared with 18.2% of White British and 13.8% of Irish individuals. Pakistani and Bangladeshi persons also show the lowest share in the richest fifth of the income distribution (9.2% and 10.1%, respectively), compared with 28.6% of Irish and 27.7% of Other White individuals. From Figure 2, it can be seen that only 3.3% of Bangladeshi individuals are located in the lowest (i.e. least deprived) quintile of individual deprivation, compared with more than 25% of White British individuals. By contrast, more than 40% of Bangladeshi and African persons are found in the highest quintile

of individual deprivation. Finally, in terms of own-ethnic density and neighbourhood-level deprivation (Table 1), it is Pakistani and Bangladeshi individuals who reside in areas with both high own-ethnic density and high area deprivation.

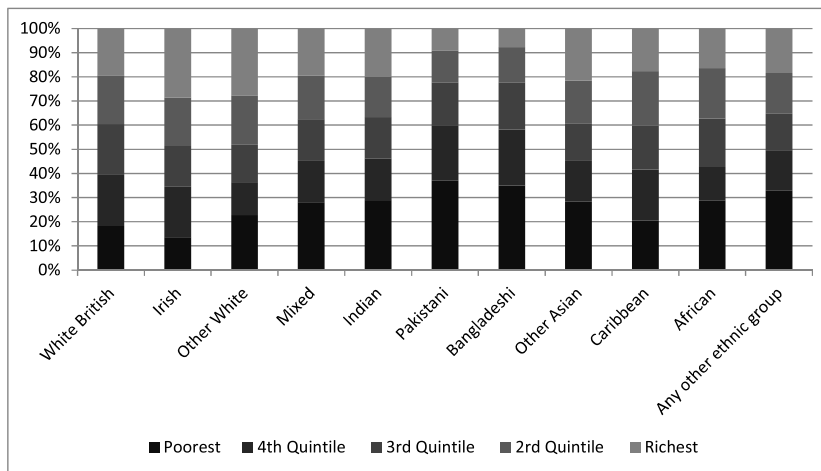
Tables 2 and 3 illustrate the respective results for five models of reporting poor self-rated health and reporting that their health limits their typical activities for the whole sample. The relative odds of reporting poor health increase with age, and women are more likely to report poor self-rated health than men (Table 2). Individuals from most BME groups are more likely to report poor self-rated health than the White British group (Indian, Pakistani, Bangladeshi, Caribbean, and any Other ethnic group). In particular, Pakistani individuals are the most likely to report poor self-rated health (odds ratio=3.13) (model 1). Model 1 shows significant health inequalities between persons from BME communities and White British persons. Model 2 presents a strong and significant gradient in the effects of own-ethnic density on reporting poor self-rated health. Individuals from BME groups residing in areas with a higher own-ethnic density are more likely to report poor self-rated health. For instance, individuals residing in areas where more than 50% of the population comes from their own-ethnic group are 2.19 times more likely to report poor self-rated health than those living in areas where less than 5% of people come from their own-ethnic group. Similarly, individuals from BME groups residing in areas where between 10% and 19% of the population come from their own-ethnic group are 1.43 times more likely to report poor self-rated health than those living in areas where less than 5% come from their own-ethnic group. After controlling for income (Model 3), the differentials of the effect of ethnic density on reporting poor health become smaller; however, the pattern of this effect does not change substantially. Lower income is associated with higher odds of reporting poor health. The inclusion of individual deprivation in Model 4 reduced the effect of ethnic density on reporting poor health, as only individuals from BME groups living in areas where above 50% of the population comes from their own-ethnic group are 1.54 times more likely to report poor health than those living in areas with less than 5% of the population coming from their own-ethnic group. The results also show that individuals experiencing higher degrees of individual deprivation are more likely to report

Table 1. Descriptive characteristics of ethnic groups.

	White British (n = 27,627) %	Irish (n = 273) %	Other White (n = 881) %	Mixed (n = 629) %	Indian (n = 1,502) %	Pakistani (n = 1,209) %	Bangladeshi (n = 884) %	Other Asian (n = 569) %	Caribbean (n = 911) %	African (n = 979) %	Any Other ethnic group (n = 74) %
Self-rated health											
Good	93.2	92.3	96.1	94.6	93.8	88.4	90.3	95.6	91.5	96.4	91.4
Poor	6.8	7.7	3.9	5.4	6.2	11.6	9.7	4.4	8.5	3.6	8.6
Health limits typical activities											
No limitation	80.3	78.8	87.3	84.6	77.9	73.8	76.7	86.6	75.9	87.5	78.8
Some limitation	19.7	21.2	12.7	15.4	22.1	26.2	23.3	13.4	24.1	12.5	21.2
Age mean (SD)	48 (18)	51 (16)	41 (15)	36 (15)	41 (15)	36 (14)	35 (13)	38 (14)	46 (17)	37 (13)	40 (15)
Gender											
Male	43.8	45.4	37.1	40.4	49.4	46.2	49.3	45.5	39.3	41.4	44.4
Income quintiles											
Richest	19.4	28.6	27.7	19.6	20.1	9.2	10.1	24.1	19.5	19.3	20.7
2th	20.2	20.1	20.4	18	16.6	13.2	13.8	17.6	22.9	19.4	16.4
3rd	21	16.8	15.6	17.3	17	17.9	20.1	14.1	18.6	19.9	14.7
4nd	21.2	20.9	13.5	17	17.2	22.7	22.3	17	19.1	13.2	17.2
Poorest	18.2	13.8	22.8	28.1	29	37	33.7	27.2	19.9	28.2	31
Individual deprivation quintiles											
Least deprived	25.8	19.8	18.4	16.7	22.8	9.2	3.3	15.3	8.9	4.8	10.5
2th	19.2	17.2	17.7	14.8	20.4	12.4	9.2	16.3	11.7	7.8	10.1
3rd	21.4	24.9	18.2	17.6	18.8	17.9	19.8	22.1	17.3	15.7	23.1
4nd	19.3	19.0	24.9	21.8	21.0	27.0	27.5	23.0	25.1	25.4	23.0
Most deprived	14.4	19.0	20.9	29.1	17.0	33.5	40.3	23.2	36.9	46.3	33.3
Ethnic density											
0–4.9%	–	96.0	40.9	60.7	27.4	17.8	16.1	46.0	44.8	28.2	61.8
5–9.9%	–	4.0	22.4	37.0	14.7	9.7	8.7	35.0	27.0	24.2	24.9
10–19.9%	–	–	26.4	2.2	21.0	14.2	11.7	15.3	27.0	35.0	12.2
20–49.9%	–	–	10.3	–	29.0	30.2	37.4	3.7	1.2	12.6	1.1
50% and over	–	–	–	–	7.9	28.1	26.1	–	–	–	–
(Raw range)	–	0.1–7.9	0.2–38.7	0.1–11.5	0–84.4	0.1–85.0	0–90.3	0–28.8	0–26.5	0–41.0	0–27.8
Index of Multiple Deprivation mean (SD)	20 (15)	22 (16)	23 (15)	30 (17)	27 (14)	41 (17)	44 (14)	25 (15)	34 (15)	36 (15)	28 (16)

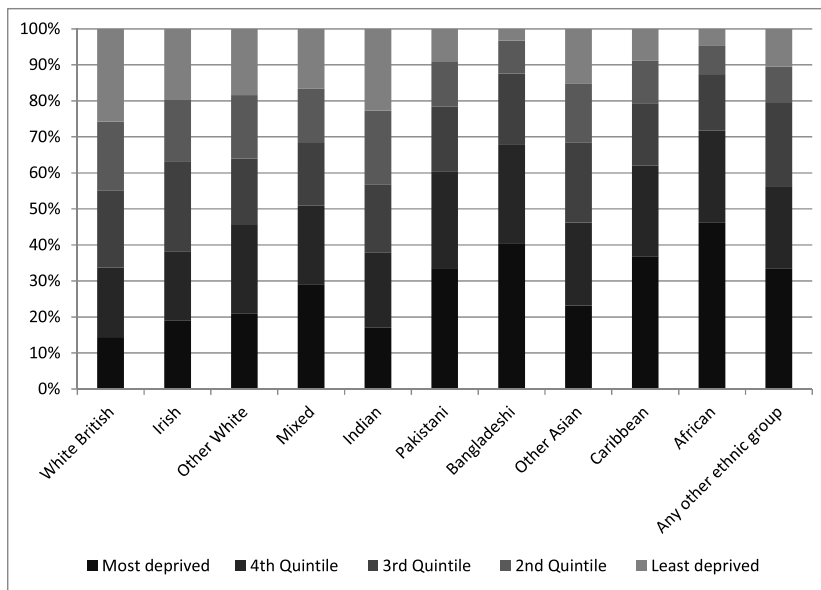
Source: Authors' analysis of UKHLS wave 1. SD, standard deviation; UKHLS, UK Household Longitudinal Study.

Ethnic Density and Health



Source: Authors' analysis of UKHLS wave 1

Figure 1. Percentage of income quintile by ethnicity [weighted quintiles: 0–430; 430–926; 926–1,474; 1,474–2,350; and above 2,350 (richest)]. Source: authors' analysis of the UK Household Longitudinal Study wave 1.



Source: Authors' analysis of UKHLS wave 1

Figure 2. Percentage of quintile of summed experience of individual deprivation by ethnicity [weighted quintiles: 0–2 (least deprived), 2–3, 3–5, 5–7, and above 7 (most deprived)]. Source: authors' analysis of the UK Household Longitudinal Study wave 1.

poor self-rated health. In model 5, the addition of the factor of area deprivation further mediated the effect of own-ethnic density on self-rated health. There is no association between own-ethnic density and self-rated health after controlling for area deprivation, while living in areas with a higher level of deprivation is positively associated with reporting poor self-rated health.

In terms of the extent to which their health limits their typical activities, the results are broadly similar as those in the models of self-rated health (Table 3). There was a significant positive association between individuals' own-ethnic density and their reporting that their health limits their typical activities (model 2), and such differentials have been mediated by individual income

Table 2. Multilevel logistic regression (ORs) of reporting 'poor health' (whole sample).

	Model 1 OR (95 CI)	Model 2 OR (95 CI)	Model 3 OR (95 CI)	Model 4 OR (95 CI)	Model 5 OR (95 CI)
Fixed part					
Age					
Female (ref: male)	1.04 (1.04–1.04)***	1.04 (1.04–1.04)***	1.04 (1.03–1.04)***	1.03 (1.03–1.03)***	1.04 (1.03–1.04)***
Ethnicity (ref: White British)	1.11 (1.02–1.20)**	1.10 (1.01–1.20)**	0.95 (0.88–1.04)	0.95 (0.87–1.03)	0.97 (0.88–1.05)
Irish	1.05 (0.66–1.67)	1.04 (0.66–1.66)	1.10 (0.69–1.76)	0.98 (0.61–1.58)	0.92 (0.57–1.50)
Other White	0.77 (0.54–1.10)	0.64 (0.44–0.94)**	0.71 (0.49–1.04)*	0.64 (0.43–0.94)**	0.67 (0.46–0.99)**
Mixed	1.35 (0.94–1.94)	1.24 (0.85–1.81)	1.25 (0.86–1.82)	1.02 (0.69–1.48)	0.93 (0.63–1.36)
Indian	1.31 (1.04–1.64)**	0.96 (0.72–1.28)	0.97 (0.73–1.30)	1.02 (0.77–1.36)	1.06 (0.80–1.40)
Pakistani	3.13 (2.56–3.83)***	2.03 (1.51–2.72)***	1.88 (1.40–2.53)***	1.62 (1.21–2.17)***	1.43 (1.07–1.92)**
Bangladeshi	2.74 (2.12–3.55)***	1.82 (1.31–2.54)***	1.63 (1.17–2.28)**	1.30 (0.93–1.82)	1.14 (0.82–1.59)
Other Asian	1.05 (0.70–1.58)	0.91 (0.59–1.40)	0.94 (0.61–1.45)	0.84 (0.54–1.30)	0.87 (0.56–1.34)
Caribbean	1.40 (1.09–1.80)***	1.19 (0.89–1.57)	1.19 (0.89–1.58)	0.89 (0.67–1.19)	0.77 (0.58–1.03)*
African	0.84 (0.59–1.20)	0.66 (0.45–0.98)**	0.67 (0.45–0.98)**	0.46 (0.31–0.68)***	0.41 (0.28–0.61)***
Any Other ethnic group	1.90 (1.43–2.51)***	1.71 (1.27–2.30)***	1.72 (1.28–2.32)***	1.35 (1.00–1.82)*	1.31 (0.97–1.77)*
Ethnic density (ref: 0–4.9%)					
5–9.9%		1.23 (0.94–1.60)	1.19 (0.91–1.55)	1.06 (0.82–1.39)	0.96 (0.74–1.26)
10–19.9%		1.43 (1.09–1.88)***	1.39 (1.06–1.82)**	1.24 (0.95–1.63)	1.07 (0.81–1.40)
20–49.9%		1.50 (1.11–2.03)***	1.41 (1.04–1.91)**	1.25 (0.92–1.69)	1.02 (0.76–1.38)
50% and over		2.19 (1.54–3.10)***	1.94 (1.37–2.76)***	1.54 (1.09–2.18)**	1.15 (0.81–1.63)
White British					
Income quintiles (ref: richest)					
2nd quintile			2.63 (2.18–3.18)***	2.11 (1.74–2.56)***	1.98 (1.63–2.41)***
3rd quintile			4.13 (3.45–4.95)***	2.88 (2.40–3.47)***	2.64 (2.19–3.17)***
4th quintile			4.31 (3.60–5.16)***	2.87 (2.38–3.46)***	2.62 (2.17–3.16)***
Poorest			2.99 (2.47–3.62)***	2.20 (1.81–2.67)***	2.04 (1.68–2.48)***
Individual deprivation quintiles (ref: least deprived)					
2nd quintile				1.36 (1.12–1.67)***	1.30 (1.06–1.58)**
3rd quintile				1.60 (1.34–1.90)***	1.43 (1.21–1.70)***
4th quintile				2.29 (1.94–2.71)***	1.94 (1.64–2.30)***
Most Deprived				4.13 (3.53–4.83)***	3.17 (2.70–3.73)***
Index of Multiple Deprivation					1.02 (1.02–1.02)***
Random part					
Level 2					
Variation	0.342***	0.337***	0.285***	0.228***	0.174***

ORs, odds ratio; CI, confidence interval.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3. Multilevel logistic regression (ORs) of reporting that health limits typical activities (whole sample).

	Model 1 OR (95 CI)	Model 2 OR (95 CI)	Model 3 OR (95 CI)	Model 4 OR (95 CI)	Model 5 OR (95 CI)
Fixed part					
Age					
Female (ref: male)	1.06 (1.05–1.06)***	1.06 (1.05–1.06)***	1.05 (1.05–1.05)***	1.05 (1.05–1.05)***	1.05 (1.05–1.05)***
Ethnicity (ref: White British)	1.47 (1.38–1.55)***	1.47 (1.38–1.55)***	1.29 (1.21–1.36)***	1.30 (1.22–1.38)***	1.31 (1.23–1.39)***
Irish	1.02 (0.74–1.40)	1.01 (0.73–1.39)	1.06 (0.76–1.46)	0.97 (0.70–1.34)	0.95 (0.68–1.32)
Other White	0.91 (0.74–1.13)	0.81 (0.64–1.02)*	0.88 (0.70–1.10)	0.82 (0.65–1.03)*	0.84 (0.66–1.06)
Mixed	1.54 (1.21–1.95)***	1.41 (1.10–1.81)***	1.43 (1.11–1.83)***	1.24 (0.96–1.59)*	1.18 (0.92–1.51)
Indian	2.01 (1.75–2.32)***	1.63 (1.37–1.95)***	1.64 (1.38–1.96)***	1.71 (1.43–2.04)***	1.74 (1.46–2.08)***
Pakistani	3.33 (2.86–3.88)***	2.51 (2.05–3.07)***	2.33 (1.90–2.85)***	2.08 (1.70–2.54)***	1.94 (1.58–2.38)***
Bangladeshi	3.12 (2.58–3.77)***	2.35 (1.87–2.96)***	2.13 (1.69–2.68)***	1.77 (1.41–2.24)***	1.64 (1.30–2.07)***
Other Asian	1.24 (0.96–1.61)*	1.11 (0.85–1.46)	1.13 (0.86–1.48)	1.04 (0.79–1.37)	1.05 (0.80–1.38)
Caribbean	1.54 (1.30–1.83)***	1.39 (1.15–1.68)***	1.41 (1.16–1.71)***	1.13 (0.93–1.38)	1.05 (0.86–1.28)
African	1.15 (0.94–1.42)	0.99 (0.79–1.25)	1.00 (0.79–1.26)	0.74 (0.59–0.94)**	0.70 (0.55–0.88)***
Any Other ethnic group	1.89 (1.54–2.31)***	1.75 (1.42–2.16)***	1.74 (1.41–2.15)***	1.44 (1.16–1.78)***	1.42 (1.14–1.76)***
Ethnic density (ref: 0–4.9%)					
5–9.9%		1.24 (1.05–1.47)**	1.21 (1.02–1.44)**	1.11 (0.93–1.32)	1.06 (0.89–1.26)
10–19.9%		1.17 (0.97–1.40)*	1.13 (0.94–1.36)	1.04 (0.86–1.25)	0.96 (0.80–1.15)
20–49.9%		1.42 (1.17–1.73)***	1.35 (1.10–1.64)***	1.22 (1.00–1.49)**	1.10 (0.90–1.35)
50% and over		1.62 (1.26–2.09)***	1.47 (1.14–1.90)***	1.22 (0.94–1.57)	1.03 (0.80–1.34)
White British					
Income quintiles (ref: richest)					
2nd quintile			1.71 (1.54–1.90)***	1.47 (1.32–1.63)***	1.43 (1.29–1.59)***
3rd quintile			2.39 (2.16–2.64)***	1.85 (1.67–2.06)***	1.78 (1.60–1.97)***
4th quintile			2.64 (2.38–2.91)***	1.98 (1.78–2.20)***	1.90 (1.71–2.11)***
Poorest			2.17 (1.96–2.42)***	1.77 (1.59–1.97)***	1.72 (1.54–1.91)***
Individual deprivation quintiles (ref: least deprived)					
2nd quintile				1.12 (1.00–1.25)*	1.09 (0.97–1.22)
3rd quintile				1.32 (1.20–1.46)***	1.26 (1.14–1.39)***
4th quintile				1.73 (1.57–1.91)***	1.60 (1.45–1.77)***
Most deprived				2.80 (2.55–3.08)***	2.46 (2.23–2.71)***
Index of Multiple Deprivation					1.01 (1.01–1.01)***
Random part					
Level 2					
Variation	0.246***	0.244***	0.219***	0.190***	0.175***

ORs, odds ratio; CI, confidence interval.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

and by deprivation at both the individual and neighbourhood levels. Again, living in areas with a higher level of deprivation is positively associated with reporting that one's health limits one's typical activities (model 5).

In order to demonstrate whether the effect of own-ethnic density on physical health outcomes varies across different ethnic groups, Tables 3 and 4 include the own-ethnic density and area deprivation effects on reporting poor self-rated health and on reporting that their health limits their typical activities from model 2 to model 5. In terms of reporting poor self-rated health, the effect of own-ethnic density is statistically significant only for Pakistani individuals, meaning that such individuals living in higher ethnic density areas are more likely to report poor health. Such an association has not been mediated by individual income or by deprivation at the individual and neighbourhood levels. In addition, individuals of South Asian heritage (Indian, Pakistani, and Bangladeshi) are all more likely to report poor self-rated health outcomes when residing in higher-deprivation areas.

In terms of reporting one's health as limiting one's typical activities, the effect of higher own-ethnic density is demonstrated for Other White, Pakistani, and Bangladeshi individuals and for individuals from any Other ethnic group. However, the own-ethnic density effect on reporting that one's health limits one's typical activities becomes not significant after controlling for deprivation at both the individual and neighbourhood levels. There is no significant effect of the level of neighbourhood deprivation on one's health as limiting one's typical activities for all ethnic groups (Table 5).

DISCUSSION

This study investigated the effect of own-ethnic density on physical health outcomes among BME groups in England and Wales using a lower level of geography to depict neighbourhoods than that used by previous studies. It also examined whether the differential effect of own-ethnic density on physical health varies across different ethnic groups. Without considering area deprivation, individuals from BME groups are more likely to report poor self-rated health and to report that their health limits their typical activities. These findings are consistent with previous

research on physical health outcomes in the UK, highlighting that ethnic density does *not* show a protective effect for certain health outcomes (Stafford *et al.*, 2009). After controlling for area deprivation, the effect of ethnic density on both health outcomes appears to become not statistically significant, while individuals living in areas experiencing high deprivation are more likely to report poor health outcomes. These findings not only imply a detrimental association between area deprivation and health outcomes, which is consistent with previous research in the UK (i.e. Karlsen *et al.*, 2002; Becares *et al.*, 2012b), but also highlight a confounding impact of area deprivation on the effects of ethnic density on health outcomes, even though the effects of area deprivation and ethnic density on physical health outcomes operate in the same direction. This finding constitutes a key original contribution of this study.

In terms of the differential effect of own-ethnic density on physical health across different ethnic groups, Pakistani individuals appear to be statistically significantly *more* likely to report poor self-rated health when residing in areas with a higher level of own-ethnic density, which runs counter to the protective or 'buffering' hypothesis. In contrast, although the effect of own-ethnic density was not statistically significant for Bangladeshi and Other Asian individuals, nevertheless, the findings seem to imply decreased odds of reporting poor self-rated health for such individuals when they live in areas where more than 5% of the population come from their own-ethnic group, suggesting that the effect of ethnic density on self-reported health may vary across different BME communities. Taking limiting health as the outcome variable, Other White, Pakistani, and Bangladeshi individuals and those from any Other ethnic groups are significantly more likely to report their health as limiting their typical activities when residing in areas with high own-ethnic density. There are, however, signs of a protective impact of ethnic density among Other Asian, Caribbean, and African individuals (although such results are not statistically significant), again highlighting variation across BME communities.

For the area deprivation effect, individuals of South Asian heritage (Indian, Pakistani, and Bangladeshi) are all shown to be more likely to report poor self-rated health outcomes when living in areas with higher deprivation. Bangladeshi and Pakistani persons are the most likely to live

Table 4. Multilevel logistic regression (ORs) of reporting 'poor health' by neighbourhood-level ethnic density and deprivation for ethnicity minorities.

		Ethnic density					Index of Multiple Deprivation	
		Model 2	Model 3	Model 4	Model 5	OR (95 CI)	OR (95 CI)	
		OR (95 CI)	OR (95 CI)	OR (95 CI)	OR (95 CI)			
Indian	Ethnic density (ref: 0-4.9%)					IMD	1.02 (1.00-1.04)**	
	5-9.9%	1.66 (0.77-3.57)	1.55 (0.72-3.36)	1.60 (0.73-3.51)	1.64 (0.75-3.62)			
	10-19.9%	1.56 (0.77-3.14)	1.51 (0.74-3.06)	1.52 (0.74-3.14)	1.60 (0.77-3.31)			
	20-49.9%	1.22 (0.63-2.38)	1.12 (0.57-2.21)	1.17 (0.59-2.31)	1.16 (0.59-2.31)			
	50% +	2.14 (0.88-5.21)	1.97 (0.80-4.82)	1.64 (0.66-4.09)	1.63 (0.65-4.04)			
Pakistani	Ethnic density (ref: 0-4.9%)					IMD	1.02 (1.00-1.03)**	
	5-9.9%	1.53 (0.54-4.28)	1.48 (0.53-4.15)	1.56 (0.54-4.51)	1.49 (0.51-4.30)			
	10-19.9%	2.56 (1.13-5.83)**	2.54 (1.11-5.80)**	2.49 (1.07-5.79)**	2.07 (0.88-4.88)*			
	20-49.9%	3.24 (1.57-6.70)***	3.26 (1.57-6.77)***	3.14 (1.49-6.62)***	2.46 (1.14-5.32)**			
	50% +	4.23 (2.06-8.70)***	4.04 (1.96-8.34)***	3.40 (1.62-7.14)***	2.39 (1.08-5.28)**			
Bangladeshi	Ethnic density (ref: 0-4.9%)					IMD	1.02 (1.00-1.04)*	
	5-9.9%	0.83 (0.27-2.58)	0.79 (0.25-2.48)	0.64 (0.20-2.05)	0.59 (0.18-1.90)			
	10-19.9%	0.94 (0.35-2.55)	0.97 (0.35-2.65)	0.71 (0.25-1.99)	0.62 (0.22-1.73)			
	20-49.9%	1.10 (0.53-2.30)	1.05 (0.49-2.24)	0.78 (0.36-1.69)	0.60 (0.26-1.35)			
	50% +	1.83 (0.84-3.99)	1.81 (0.82-4.04)	1.37 (0.61-3.08)	0.97 (0.40-2.31)			
Other Asian	Ethnic density (ref: 0-4.9%)					IMD	1.01 (0.98-1.04)	
	5-9.9%	1.07 (0.42-2.69)	1.05 (0.41-2.68)	0.77 (0.29-2.07)	0.76 (0.28-2.04)			
	10-19.9%	0.87 (0.23-3.38)	0.81 (0.21-3.21)	0.75 (0.19-2.94)	0.76 (0.19-3.04)			
	20-49.9%	1.34 (0.15-12.21)	1.38 (0.15-12.63)	0.94 (0.10-9.19)	0.98 (0.10-9.78)			

Models for Irish, Other White, Mixed, Caribbean, and any Other ethnic did not converge.

ORs, odds ratio; CI, confidence interval.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5. Multilevel logistic regression (ORs) of reporting that health limits typical activities by neighbourhood-level ethnic density and deprivation for ethnicity minorities.

		Ethnic density			
		Model 2 OR (95 CI)	Model 3 OR (95 CI)	Model 4 OR (95 CI)	Model 5 OR (95 CI)
Irish	Ethnic density (ref: 0–4.9%)	0.53 (0.06–4.74)	0.58 (0.06–5.68)	0.38 (0.04–4.09)	0.36 (0.03–4.17)
	5–9.9%				
	10–19.9%				
Other White	Ethnic density (ref: 0–4.9)	1.65 (0.92–2.95)*	1.58 (0.87–2.85)	1.43 (0.78–2.63)	1.40 (0.76–2.58)
	5–9.9%				
	10–19.9%				
Indian	Ethnic density (ref: 0–4.9%)	2.46 (1.19–5.10)**	2.44 (1.16–5.13)**	2.03 (0.95–4.35)*	1.92 (0.88–4.17)
	5–9.9%				
	10–19.9%				
Pakistani	Ethnic density (ref: 0–4.9%)	1.31 (0.82–2.09)	1.24 (0.77–1.99)	1.17 (0.72–1.89)	1.18 (0.73–1.92)
	5–9.9%				
	10–19.9%				
Bangladeshi	Ethnic density (ref: 0–4.9%)	0.58 (0.28–1.19)	0.54 (0.26–1.13)	0.59 (0.28–1.24)	0.58 (0.27–1.23)
	5–9.9%				
	10–19.9%				
Other Asian	Ethnic density (ref: 0–4.9%)	1.36 (0.77–2.41)	1.30 (0.73–2.32)	1.27 (0.71–2.28)	1.22 (0.67–2.22)
	5–9.9%				
	10–19.9%				
Caribbean	Ethnic density (ref: 0–4.9%)	1.76 (1.08–2.87)**	1.65 (1.01–2.70)**	1.59 (0.96–2.62)*	1.50 (0.89–2.54)
	5–9.9%				
	10–19.9%				
African	Ethnic density (ref: 0–4.9%)	2.05 (1.25–3.35)***	1.85 (1.12–3.06)**	1.58 (0.95–2.64)*	1.45 (0.83–2.56)
	5–9.9%				
	10–19.9%				
Caribbean	Ethnic density (ref: 0–4.9%)	1.89 (0.88–4.06)	1.82 (0.85–3.93)	1.72 (0.78–3.76)	1.68 (0.76–3.68)
	5–9.9%				
	10–19.9%				
African	Ethnic density (ref: 0–4.9%)	1.79 (0.87–3.71)	1.79 (0.86–3.72)	1.57 (0.75–3.31)	1.47 (0.69–3.13)
	5–9.9%				
	10–19.9%				
Caribbean	Ethnic density (ref: 0–4.9%)	2.08 (1.17–3.70)**	2.06 (1.15–3.67)**	1.75 (0.96–3.17)*	1.56 (0.83–2.93)
	5–9.9%				
	10–19.9%				
African	Ethnic density (ref: 0–4.9%)	2.09 (1.12–3.91)**	2.04 (1.09–3.83)**	1.73 (0.91–3.32)*	1.48 (0.73–3.01)
	5–9.9%				
	10–19.9%				
Caribbean	Ethnic density (ref: 0–4.9%)	1.23 (0.69–2.18)	1.18 (0.66–2.13)	0.94 (0.51–1.72)	0.94 (0.51–1.74)
	5–9.9%				
	10–19.9%				
African	Ethnic density (ref: 0–4.9%)	0.90 (0.39–2.07)	0.79 (0.34–1.84)	0.73 (0.31–1.68)	0.72 (0.31–1.67)
	5–9.9%				
	10–19.9%				
Caribbean	Ethnic density (ref: 0–4.9%)	1.40 (0.36–5.50)	1.29 (0.33–5.10)	0.89 (0.22–3.67)	0.87 (0.21–3.61)
	5–9.9%				
	10–19.9%				
African	Ethnic density (ref: 0–4.9%)	1.07 (0.70–1.63)	1.04 (0.68–1.61)	0.88 (0.56–1.37)	0.84 (0.53–1.32)
	5–9.9%				
	10–19.9%				
Caribbean	Ethnic density (ref: 0–4.9%)	1.20 (0.79–1.82)	1.13 (0.74–1.73)	0.94 (0.61–1.45)	0.88 (0.55–1.38)
	5–9.9%				
	10–19.9%				
African	Ethnic density (ref: 0–4.9%)	2.26 (0.55–9.20)	2.53 (0.59–10.80)	2.45 (0.58–10.38)	2.16 (0.49–9.50)
	5–9.9%				
	10–19.9%				
Caribbean	Ethnic density (ref: 0–4.9%)	1.49 (0.84–2.67)	1.38 (0.77–2.49)	1.18 (0.65–2.16)	1.23 (0.67–2.26)
	5–9.9%				
	10–19.9%				
African	Ethnic density (ref: 0–4.9%)	0.94 (0.54–1.63)	0.90 (0.51–1.58)	0.80 (0.45–1.42)	0.86 (0.46–1.60)
	5–9.9%				
	10–19.9%				

Continued

Table 5. (Continued)

		Ethnic density				
		Model 2 OR (95 CI)	Model 3 OR (95 CI)	Model 4 OR (95 CI)	Model 5 OR (95 CI)	
Any Other ethnic	20–49.9%	0.88 (0.41–1.87)	0.80 (0.87–1.74)	0.67 (0.30–1.50)	0.74 (0.32–1.70)	
	Ethnic density (ref: 0–4.9%)					
	5–9.9%	1.86 (1.13–3.06)**	1.75 (1.05–2.91)**	1.56 (0.92–2.64)	1.49 (0.86–2.61)	
	10–19.9%	2.11 (1.13–3.96)**	2.11 (1.12–3.99)**	1.66 (0.86–3.20)	1.56 (0.77–3.18)	
	20–49.9%	2.45 (0.35–16.99)	2.13 (0.30–15.40)	2.08 (0.29–15.05)	1.96 (0.27–14.50)	

There is no significant effect of Index of Multiple Deprivation on individual's reporting that health limits typical activities.
 ORs, odds ratio; CI, confidence interval.
 *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

in deprived neighbourhoods (Jivraj & Khan, 2013), and we do find that Pakistani people appear to have the lowest socio-economic status and reside in areas with both high own-ethnic density and high deprivation. Previous findings also show that an increase in area deprivation translates into a linear increase in the predicted probabilities of reporting poor self-rated health for Pakistani people (Becares *et al.*, 2012b).

After controlling for both the effect of ethnic density and deprivation on health outcomes, there remain important health inequalities between persons from some BME communities and White British persons. Pakistani individuals and individuals from any Other ethnic group are more likely to report poor self-rated health than White British individuals, while individuals of South Asian origin (Pakistani, Indian, and Bangladeshi) and those from any Other ethnic group are more likely to report that their health limits their typical activities than White British individuals, even after taking into account economic disadvantage (lower income and higher individual deprivation). The results in this study are partially consistent with the study of Darlington *et al.* (2015). On the one hand, being of South Asian origin is still significantly associated with a greater likelihood of reporting a limiting illness after adjusting for socio-economic factors; on the other hand, although there were signs of Pakistani and Bangladeshi individuals being more likely to report poor self-rated health after controlling for socio-economic factors, nevertheless, the results are not statistically significant in the study of Darlington *et al.* (2015). These differences could be due to the different socio-economic factors used between this paper and the study of Darlington *et al.* (2015), and the small sample sizes of ethnic groups in the latter study, particularly for Indian, Pakistani, and Bangladeshi groups.

LIMITATIONS

Although this study makes an important contribution to the debate on the association between ethnic density and physical health, limitations remain. Firstly, the same cut-off points were applied to the measurement of ethnic density for each BME group in order to obtain comparable results between the different ethnic groups. However, the degree of residential ethnic density differs across ethnic groups, which may result in the results of this study underestimating the effect

of ethnic density for some ethnic groups. In addition, the sample sizes for certain BME groups are not large, and this could reduce the power to detect the effect of higher ethnic density on health outcomes. Secondly, this study used cross-sectional data, which allows us to explore the association between ethnic density and health, but not the direction of causality; it is possible to use longitudinal data to examine the changes in ethnic density and its lagged effects, which would add a different contribution to this literature. However, about 32% of BME respondents are lost to follow-up in the second wave of the UKHLS data set, which could present an important challenge for such analysis using that data set. Thirdly, the IMDs used here are country specific, and the IMDs for England and for Wales are not directly comparable (Norman, 2010). We investigated the inclusion of a Wales/England dummy in the models; however, the findings including the dummy were not different from the current results, and there were no statistically significant differences between Wales and England (results not shown). Another potential issue in the usage of IMDs is whether or not to include the health domain in the index. Such inclusion could result in mathematical coupling in the health inequalities analyses (Adams & White, 2006); however, Adams and White (2006) found that removing the health domain from the IMD has little effect on the relationship between the IMD and Census measures of health outcomes (limiting long-term illness and self-rated health). Their findings suggested that removing the health domain from the IMD is unnecessary for routine public health analyses using Census measures of health. This may be due to these two health outcomes not closely approximating to those included in the health domain of the IMD. Despite these limitations, the findings in this paper provide additional insight into the effects of ethnic density and area deprivation on physical health, with a more appropriate geography scale applied.

CONCLUSIONS

In the coming decades, it is likely that ethnic concentration will continue to be a dominant local area characteristic for individuals from some BME communities, particularly for Pakistani individuals, and it is also likely that persons from BME groups will still be increasingly concentrated in economically disadvantaged areas (Harris *et al.*,

2015). These findings therefore have important policy implications: the improvement of the physical environment as well as the economic and social conditions for individuals living in deprived areas needs to be addressed. In addition, Pakistani and Bangladeshi individuals are the most likely to live in deprived neighbourhoods and are also more likely to report poor health when residing in highly deprived areas. Therefore, for persons from specific BME groups such as these, it is important to mitigate the adverse effect of living in a deprived neighbourhood on health, for example, by improving employment opportunities, developing health facilities, improving one's living environment, and reducing the barriers to public services such as housing, health, and social care. Without such interventions, inequalities in health outcomes among individuals from different BME groups will persist into the third decade of the 21st century.

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APPENDIX

Table A1: Descriptive univariate information for the experience of deprivation from 16 question items from the household questionnaire and 8 question items from the individual questionnaire in the data set.

<i>Information from household questionnaire</i>	
Have central heating	Yes (92.8), No (7.2)
Have car(s)	Yes (81.8), No (18.2)
Have colour television	Yes (98.5), No (1.5)
Have video recorder/DVD player	Yes (91.7), No (8.3)
Have satellite dish/Sky TV	Yes (49.7), No (50.3)
Have cable TV	Yes (20.5), No (79.5)
Have deep freeze or fridge freezer	Yes (94.4), No (5.6)
Have washing machine	Yes (97.1), No (2.9)
Have tumble drier	Yes (57.0), No (43)
Have dishwasher	Yes (44.4), No (55.6)
Have microwave oven	Yes (92.7), No (7.3)
Have home computer/PC (not games console)	Yes (80.9), No (19.1)
Have compact disc player	Yes (73.4), No (26.6)
Have landline telephone	Yes (89.7), No (10.3)
Have mobile telephone (anyone in household)	Yes (93.4), No (6.6)
Have Access Internet	Yes (77.2), No (22.8)
<i>Information from individual questionnaire</i>	
Have holiday	I/we have this (62.3), I/we do not want this at the moment (12), can't afford it (25.8)
Have friends/family around for drink or meal	I/we have this (66.6), I/we do not want this at the moment (24.9), can't afford it (8.5)
Have all weather shoes	I/we have this (93.6), I/we do not want this at the moment (2), can't afford it (4.5)
Have house in decent state of repair	I/we have this (83.3), I/we do not want this at the moment (2.1), can't afford it (14.6)
Have household contents insurance	I/we have this (79.9), I/we do not want this at the moment (8.7), can't afford it (11.5)
Have regular savings	I/we have this (69.9), I/we do not want this at the moment (4.9), can't afford it (25.2)
Have replace worn out furniture	I/we have this (65.5), I/we do not want this at the moment (6.7), can't afford it (27.8)
Have replace or repair major electrical goods	I/we have this (72.7), I/we do not want this at the moment (4.7), can't afford it (22.6)
Summary experience of deprivation score:	Ranging between 0 ~ 23, mean = 5.5; Quintiles: 2,3, 5, and 7.

Source: Authors' analysis of UKHLS wave 1.