The buffering effects of ethnic density on experienced racism and health

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Abstract

Studies in the United Kingdom (UK) show a consistent inequality between the health of ethnic minorities and that of White people. This is exacerbated by the over-representation of ethnic minorities in deprived areas, which have been associated with poorer infant and child health, chronic disease, and high mortality rates. Ethnic density, defined as the proportion of ethnic minority residents in an area, is generally thought of in relation to the negative impacts of area effects on health. However, it can be considered in terms of social networks and supportive communities, possibly mitigating the detrimental impact of racism on the health of ethnic minority people. This study investigated the ethnic density effect and hypothesised that ethnic minority people who live in areas of high ethnic density would report decreased experienced racism and better health outcomes compared with their counterparts living in areas of low ethnic density. Multiple logistic regressions were conducted using data from the Fourth National Survey of Ethnic Minorities and the 1991 UK Census. Results showed a negative association between ethnic density and psychotic symptomatology, but no evidence of an association between ethnic density and general self-rated health. Findings confirm that the experience of racism is lower in places of higher ethnic density and indicate a tendency for a weaker association between racism and health as ethnic density increases.

Running title: Ethnic density effect

Keywords: Ethnic density; Health inequalities; Racism; Ethnicity; Neighbourhood

Introduction

Inequalities in health among ethnic groups in the United Kingdom have been extensively documented, with studies on health disparities showing a consistent discrepancy between the health of Bangladeshi, Pakistani and Caribbean people compared to that of Chinese and White European people (Davey Smith et al., 2000; Erens, Primatesta, & Prior, 2001; Nazroo, 1997; 2001 a; 2003). The poorer health of some ethnic minority groups has been partly attributed to their lower socioeconomic resources and poorer standard of living (Williams, 1999; Nazroo, 2001b), as well as to experiences of interpersonal racism and discrimination, which have been associated with higher levels of stress, anxiety, onset of psychotic symptoms, hypertension, and detrimental health-related behaviours, among other health outcomes (Krieger, Rowley, Herman, Avery and Philips, 1993; Krieger & Sidney, 1996; Williams et al, 1997; Nazroo, 1998; 2001a; 2003; Williams, 1999; Yen, Ragland, Greiner & Fisher, 1999; Williams & Neighbors, 2001; Erens et al, 2001; Karlsen & Nazroo, 2002; 2004; Guthrie, Young, Williams, Boyd, & Kintner, 2002; Janssen, Hanssen, Bak et al, 2003; Harris, Tobias, Jeffreys, Waldegrave, Karlsen, & Nazroo, 2006a, 2006b; Karlsen, 2007).

The existence of interpersonal discrimination in the United Kingdom (UK) has been clearly established. The 2005/2006 British Crime Survey estimated a total of 179,000 racially motivated crimes in England and Wales in that period alone (Walker, Kershaw & Nicholas, 2006), and analyses of the Fourth National Survey on Ethnic Minorities, a national survey with an over-sample of ethnic minorities, found that in the year prior to the survey 12% of ethnic minority people had experienced racially motivated verbal abuse, 2% reported experiencing racially motivated property damage, and 13% reported

experiencing any form of racial harassment, 22% of whom experienced repeated victimisation (5 times or more; Virdee, 1997). Qualitative studies have found experiences of racial harassment to be a part of the everyday life of ethnic minority groups, and have shown that fear of experiencing racial harassment shapes the way ethnic minority people interact with their environment, reducing their quality of life and well-being (Chahal & Julienne, 1999).

Besides the direct influence that experienced racism has on health, racial discrimination also impacts health indirectly through the spatial separation of ethnic minorities from the majority population (Williams & Collins, 2001), leading to local level variations in the proportion of ethnic minority residents, or ethnic density. The development of ethnically concentrated neighbourhoods can be explained by a wide range of factors, including a need for security against racially-driven harassment and discrimination; a desire to share cultural, linguistic and religious qualities; existent interpersonal connections and employment opportunities in an area; as well as housing tenure adopted by early migrants, as private landlords and public housing allocation have restricted ethnic minority groups to areas of low-quality housing (Peach & Byron, 1994). The physical separation of relatively affluent whites and deprived ethnic minorities means that minority groups are more likely to live in more deprived areas, a factor that is associated with increased risk of all-cause mortality (Anderson et al., 1997; Davey Smith et al., 1998; Haan et al., 1987; Kaplan, 1996; LeClere et al., 1997; LeClere et al., 1998; Slogget and Joshi, 1998; Waitsman and Smith, 1998); poor infant and child health (Morgan and Chinn, 1983; O'Campo et al., 1997; Roberts, 1997); chronic disease among adults (Davey Smith et al., 1998; Diez-Roux, 1997; Humphreys and Carr-Hill, 1991;

Jones and Duncan, 1995; Krieger, 1992; Reijneveld, 1998; Robert, 1998; Shouls et al., 1996; Sloggett and Joshi, 1998); and adverse health behaviour (Curry et al., 1993; Diez-Roux et al., 1997; Karvonen and Rimpela, 1996; Kleinschmidt et al., 1995; Krieger, 1992; O'Campo et al., 1995; Reijneveld, 1998).

However, despite the evidence on the negative association between area deprivation and health, areas with high levels ethnic density have also been hypothesised to provide residents with protective effects through the ethnic density effect, which stipulates that as the proportion of an ethnic minority group in an area increases, their health complications will decrease (Faris & Dunham, 1939; Halpern, 1993; Halpern & Nazroo, 1999). It has been stated that ethnic density may aid in the development of positive roles (Smaje, 1995), and it may facilitate increased political mobilisation and material opportunities, as well as encourage healthy behaviour (Karlsen & Nazroo, 2002). Moreover, theoretical frameworks behind the ethnic density effect articulate that positive health outcomes are attributed to the protective and buffering effects from the direct or indirect consequences of discrimination, racial harassment that enhanced social cohesion, mutual social support and a stronger sense of community and belongingness provide (Bhugra & Becker, 2005; Daley, 1998; Smaje, 1995; Halpern & Nazroo, 1999). In other words, theory suggests that ethnic density is associated with better health (a protective ethnic density effect), possibly through lower exposure to discrimination, and that the impact of discrimination on health varies according to level of ethnic density (a buffering effect).

Studies that have explored the ethnic density effect have reported inconsistent results, and whereas some studies have found a protective ethnic density effect on health (Rabkin, 1979; Boydell, van Os, McKenzie, Allardyce, Goel, McCreadie and Murray,

2001; Fagg, Curtis, Stansfeld and Congdon, 2006; Fang, Madhavan, Bosworth and Alderman, 1998; Franzini and Spears, 2003; Halpern and Nazroo, 1999; Neeleman and Wessely, 1999; Neeleman, Wilson-Jones and Wessely, 2001; Pickett, Collins, Masi and Wilkinson, 2005; Wickrama, Noh and Bryant, 2005; Veling, Susser, van Os, Mackenbach, Selten, & Hoek, 2008), others have not found significant effects (Karlsen, Nazroo and Stephenson, 2002; McNally, Alston, Cairns, Eden and Birch, 2003; McNally, Alston, Cairns, Eden, Kelsey and Birch, 2003; McNally, Alston, Eden, Kelsey and Birch, 2004). This discrepancy in the findings may be because studies have used different levels of ethnic density, different ethnic groups, different national and migration contexts, different levels of geographical measurement, adjusted for different demographic and socioeconomic confounding factors, and many have lacked statistical power. Further, the possible pathways by which ethnic density impacts on health have not been explored, leaving the relationship between ethnic density and health poorly understood.

The present study aims to shed some light on the mechanisms behind the ethnic density effect by exploring the relationship between ethnic density, racism and health. Studies using Fourth National Survey on Ethnic Minorities (FNS) data have found that ethnic minorities living in areas of high ethnic density report fewer experiences of interpersonal racism compared to their counterparts living in areas of less ethnic density (Halpern & Nazroo, 1999; Dustmann, Fabri & Preston, 2004), although this was not the main focus of those studies and results were not tabulated. This study aims to further explore this relationship by analysing whether the impact of racism on health differs by the degree of an area's ethnic density. To the best of our knowledge, this is the first study to investigate whether area ethnic density has a buffering effect on the association

between racism and health. The study's theoretical rationale proposes that higher ethnic density will relate to reduced exposure to racism, and that higher ethnic density will provide a buffering, or protecting, effect that will moderate the detrimental effects of racism on residents' health.

The present study hypothesises that: i) ethnic minority people's experience of interpersonal racism will decrease as ethnic density increases, and ii) residence in an area of higher ethnic density will moderate (specifically, reduce) the impact of experienced interpersonal racism on health.

Methodology

Data

Analyses for the present study were conducted using two data sources, namely the Fourth National Survey on Ethnic Minorities (FNS) and the 1991 UK Census. Census data were linked to the FNS via participant's residential postcode in order to provide data on ethnic density and area characteristics.

The FNS was undertaken in 1994 by the Policy Studies Institute and Social and Community Planning Research (now the National Centre for Social Research) with the objective of increasing the existent knowledge of the circumstances of ethnic minorities. It conducted structured face-to-face interviews with a nationally representative sample of 5196 people of Caribbean, Indian/African Asian, Pakistani, and Bangladeshi origin, as well as with a sample of 2867 white people living in England and Wales (Moodod et al., 1997). Interviews were conducted with an ethnically matched interviewer in the language of the respondent's choice, and included questions on physical and mental health, ethnic identity, racism and discrimination, as well as a broad range of demographic and

socioeconomic factors. The survey's sampling procedures were designed to select probability samples of both individuals and households, with sampling areas selected after analysing data from the 1991 Census on the ethnic minority population size in enumeration districts and electoral wards. This sampling method produced a final sample that included respondents from areas with lower proportions of ethnic minority residents, a population typically ignored by other surveys of ethnic minority groups in the UK (Karlsen, Nazroo & Stephenson, 2002). Six weighting factors were applied to the data in order to ensure that the survey results represented the populations under study as closely as possible (for further details of the FNS methods see Smith & Prior, 1996).

Measures

Two health measures were selected to test the hypothesised buffering impact of ethnic density on health. A measure of psychotic distress, the Psychosis Screening Questionnaire (PSQ; Bebbington & Nayani, 1995), was chosen as a measure of mental health due to the strong association between discrimination and psychotic disorders that has been previously established in the literature (Halpern & Nazroo, 1999; Janssen, Hanssen, Bak, Bijl, Graaf, Vollebergh, McKenzie & Van Os, 2003; Karlsen & Nazroo, 2002; Karlsen, Nazroo, McKenzie, Bhui & Weich, 2005; Veling, Selten, Susser, Laan, Mackenbach & Hoek, 2007; Veling, Susser, van Os, Mackenbach, Selten, & Hoek, 2008). The PSQ, a 12-item measure tapping psychotic symptomatology that enquires about mania, thought insertion, paranoia, strange experiences and hallucinations, has been used and validated in the National Psychiatric Morbidity Survey (Meltzer et al., 1995), and has been subjected to ethnic group specific validation in the FNS (Nazroo,

1997). Due to the severe skewness of the response range, the PSQ was dichotomised into zero or one positive response, and two or more positive responses.

The second measure, self-rated overall health, has been shown to be a valid indicator of health status, and reports of poor health have been associated with higher mortality, psychological distress, and poor functioning (see for example Idler & Benyamini, 1997; Wannamethee & Shaper, 1991; Miilunpalo, Vuori, Oja, Pasanen & Urponen, 1997; Farmer & Ferraro, 1997; Krause & Jay, 1994). In the FNS, respondents were asked to rate their health as of the last 12 months on a scale ranging from 1 (excellent) to 5 (very poor). Responses were dichotomised into fair, poor and very poor, or excellent and good.

Experiences of interpersonal racism were analysed as a dichotomised variable that measured any experience of racial harassment in the past 12 months, including having been physically attacked, having had property deliberately damaged, or having been the victim of verbal attack for reasons to do with the respondent's race or colour.

Ethnic density, obtained from the 1991 Census, was defined as the percentage of individuals living in the respondent's ward who were of his/her same ethnic group (own ethnic density) and as the percentage of any ethnic minority people living in the respondent's ward (overall ethnic minority density). Ethnic density was analysed as a continuous variable and was measured at the ward level, which was the smallest area at which we could obtain information without breaching confidentiality contracts with the FNS respondents. We chose to analyse ethnic density at the ward level because larger areas have been argued to be too large to capture local group concentration with accuracy

(Halpern, 1993; Franzini and Spears, 2003). In 1991 there were a total of 9527 electoral wards in England and Wales, and on average each had a population of 5327 residents.

In order to measure area deprivation, ACORN (A Classification of Residential Neighbourhoods; CACI, 2006), a geodemographic classification of residential neighbourhoods which has been shown to capture socioeconomic deprivation in an area (Sheringham, Sowden, Stafford, Simms, & Raine, forthcoming) was used, categorised into 5 groups: wealthy achievers, urban prosperity, comfortably off, moderate means, and hard-pressed.

Other variables included in the analyses were respondent's age, sex and socioeconomic position, measured by Registrar General's classification of occupation.

Statistical Analysis

This study aimed to examine the association between ethnic density and health, the association between racism and health, and whether the racism-health relationship is moderated by ethnic density.

Multiple regression analyses were conducted to examine the associations between: 1) ethnic density and frequency of experiences of interpersonal racism, 2) experiences of racism and poor health, and 3) experience of racism and poor health with increasing ethnic density. Analyses were adjusted for age, sex, individual socioeconomic position and area deprivation. In order to examine whether the ethnic density effect varies between ethnic minority groups, analyses were stratified by ethnic group and were conducted using own ethnic density. A separate model was conducted for all ethnic minority people combined, using overall ethnic minority density. The last set of analyses, which had health as the outcome, included ethnic density, experience of racism and the

interaction between ethnic density and experience of racism. Separate models were conducted for each health outcome.

All data were weighted, and robust standard errors were used in order to correct for non-independence of observations due to geographic clustering. Analyses were conducted using STATA 9 (StataCorp, 2005).

Results

Pakistani and Bangladeshi people tended to be younger, in lower socioeconomic positions than all other ethnic groups, and living in more deprived areas (Table 1). Aside from whites, Pakistani and Bangladeshi people were the most concentrated, with over a quarter of their population living in areas of own-group density of 20% or more. Caribbean people tended to report more verbal attacks in the past year, followed by Pakistani people, who reported the highest percentage of physical harassment. Bangladeshi people, in contrast, reported the lowest percentage of any verbal or physical racial harassment.

As hypothesised, experiences of interpersonal racism were less likely in areas of high ethnic density, albeit only statistically significant for Bangladeshi people (OR 0.60, 95% CI 0.44-0.83; p=0.002) and all ethnic minorities combined (OR 0.91, 95% CI 0.86-0.97; p=0.003) (see table 2).

Table 3 summarises the association between racism and health and generally shows increased odds ratios of reporting psychotic symptomatology and poor overall health for those experiencing racism across all ethnic minority groups. The association was most noticeable for PSQ in Caribbean and Indian people, who were 3.47 (95% CI 2.34 to 5.15; p<0.001) and 4.15 (95% CI 2.62 to 6.56; p<0.001) times more likely, respectively, of

reporting psychotic symptomatology after experiencing physical racial harassment. The impact of racism on reports of fair, poor or very poor health was greatest for Bangladeshi people (OR 3.05, 95% CI 1.08 to 8.59; p=0.034).

Tables 4 and 5 show the age and sex adjusted, and fully adjusted odds ratios for the effect of racism, ethnic density, and the interaction between racism and ethnic density on health. Adjusting for confounders in the fully adjusted model did not greatly alter the results. A negative, albeit not significant, association was found between PSQ and overall ethnic minority density. Similar results were found for all ethnic groups in the stratified analyses except for Pakistani people. Although not significant, the interaction between ethnic density and PSQ was in the expected protective direction, indicating that the association between racism and PSQ was smaller in areas of higher ethnic density. No evidence of the ethnic density effect was found for general self-rated health. The impact of overall ethnic minority density on the health of all ethnic minorities combined changed direction once all confounders were adjusted for; however, the magnitude of the effect remained minimal. The interaction between ethnic density and self-rated health was in the expected direction for all groups except for Caribbean people, although it did not attain statistical significance in any group.

Figures 1 and 2 represent the moderating effect of ethnic density on psychotic symptomatology and overall health amongst those people who have experienced interpersonal racism, relative to those who have not. Ethnic density is shown at four different levels: 1%, 10%, 20% and 40% for Indian, Pakistani, Bangladeshi, and overall ethnic minority. Due to the different degree of concentration between ethnic groups, Caribbean density is shown at 0.5%, 5%, 10% and 20%. A (non-significant) buffering

effect of ethnic density was observed for overall ethnic minority, Caribbean and Indian people on psychotic symptomatology, and for overall ethnic minority, Bangladeshi, Indian and Pakistani people on self-rated health.

Conclusion

This study set out to explore the mechanisms behind the ethnic density effect by testing a hypothesised buffering impact of ethnic density on the detrimental impact of racism on health, whereby density reduces both exposure to racism and the impact of experienced racism. Results were consistent with previous investigations of the protective effect of ethnic density on psychosis (Faris & Dunham, 1939; Halpern & Nazroo, 1999; Boydell et al., 2001; Veling et al., 2008), and self-reported general health (Smaje, 1995). Findings confirm that the experience of racism is lower in places of higher ethnic density and indicate a tendency for a weaker association between racism and health as ethnic density increases, providing initial support for the buffering hypothesis of ethnic density. However, interaction terms were not statistically significant, and variation across ethnic groups and health outcomes were found for both the strength of the ethnic density effect, and the buffering effect of ethnic density on the association between interpersonal racism and health.

The ethnic density effect was not consistent across ethnic groups, and different results were found when analyses were conducted for all ethnic minorities combined and when analyses were stratified by ethnic group. It is unclear why a buffering trend of ethnic density was not observed for Caribbean people, and why it performed differently for those same ethnic groups across different health outcomes. It is interesting to note that although not always significant, the ethnic density effect for Pakistanis was never

protective. These results are not novel and were also reported by Halpern and Nazroo (1999), who hypothesised that variations in the ethnic density effect between ethnic groups might be due to some groups being better at protecting the mental health of their members (p.44). This finding points to the importance of analysing ethnic groups separately, discouraging, for example, the common practice of merging the Pakistani and Bangladeshi sample in order to increase statistical power. It also highlights the importance of comparing different outcomes in the same sample, which is not common practice in studies of the ethnic density effect. Ethnic minority groups in the UK differ greatly by their reasons for immigration, settlement patterns, and age structure, and thus it is possible that living among co-ethnics does not have the same impact for all ethnic groups or for all health outcomes. It is, then, of great importance to explore how ethnic density performs across different health outcomes for the same individuals, in order to better understand the mechanisms behind the ethnic density effect. The detrimental influence of racism and the moderating effect of ethnic density on health were observed more clearly across psychotic symptomatology, which is consistent with findings from existing studies, which generally support a relationship between racial discrimination and mental health but are less consistent for physical health (Paradies, 2006). Further, in a recent review of the effects of ethnic density on physical health, Pickett and Wilkinson (2008) mention the greater success that US studies have had in finding ethnic density effects, partly explained by the focus that US studies place on 'harder' outcomes, such as mortality and low birth weight, as compared with self-reported health (Pickett & Wilkinson, 2008; p.328).

Some initial support was found for this study's hypothesised buffering effect of ethnic density against the detrimental influence of racism on the health of ethnic minority people. The study's theoretical rationale proposes that the buffering properties found in the ethnic density effect are expected to diminish the detrimental effects of racism through two different, yet not mutually exclusive mechanisms: a) a change in the appraisal process of a stressful event such as interpersonal racial harassment, and b) the recognition and discussion of experienced discrimination with others. The first mechanism, a change in the appraisal process, is based on the premise that racial harassment is usually perceived and internalised by ethnic minority people as evidence of their own flaws and subordinate status (Krieger & Sidney, 1996), rather than as an act perpetrated from a discriminatory and prejudicial stance. However, it is hypothesised that living among co-ethnics and/or other ethnic minority people will bestow upon the person subjected to interpersonal racial harassment a different perspective, based on the likelihood that the discriminatory event experienced is not due to an internalized individual flaw, but rather to an assault by an aberrant perpetrator. It is hypothesised that this outlook will be the consequence of increased social support derived from greater involvement and participation in the community, found in areas of high ethnic density. It is then expected that participation in the community will generate positive role models (Smaje, 1995), a stronger sense of community and belongingness (Bhugra & Becker, 2005), and enhanced social cohesion (Smaje, 1995), which are hypothesised to provide ethnic minorities with the notion that an interpersonal racist event experienced is the oddity of one individual, not a normative behaviour and a consequence of being an ethnic minority. This cognitive process, in turn, is hypothesised to decrease self-stigmatisation

and stress, which have been associated with poor physical and mental health (Anderson, Myers, Pickering & Jackson, 1989; Williams, 1992; Chakraborty & McKenzie, 2002). The second mechanism, the recognition and discussion of experienced discrimination with other ethnic minority people, emerges from the indication that an individual's social support and social networks, such as those found in neighbourhoods and residential communities, may permit an ethnic minority individual to recognize and discuss experiences of racism with others, which may mediate the association between racism and health (Karlsen & Nazroo, 2002).

An overall trend supporting the study's hypotheses was found, however, results were not statistically significant. This might be due to the sample size of the dataset used, and to the possibility that as a consequence of stratifying for ethnic group and after adjusting for confounders, analyses lacked statistical power. It is also possible that analytical power was affected by the limited range of ethnic density present in the FNS, and in the UK in general. It has been suggested that, as compared to studies conducted in the UK, ethnic density studies conducted in the US have been more successful in detecting ethnic density effects due to the greater ethnic densities of some of its populations (Pickett and Wilkinson, 2008). Further, respondents who did not state an occupation were recategorised as missing and included in the analyses; however, there were high levels of missing data and thus the possibility of residual confounding by social class (Kaufman, Cooper & McGee, 1997; Nazroo, 1998).

Although deprivation was controlled for in the analyses, it is possible that in areas of high ethnic density, which are the most deprived, the buffering effects of ethnic density are being attenuated by the detrimental impacts of deprivation on health. In our

analyses, however, area deprivation did not have an independent effect on health or experienced discrimination. Future studies might incorporate alternative measures of area deprivation to reduce the possibility of residual confounding by deprivation.

Future studies on ethnic density should ideally analyse larger and more recent datasets. However, despite its sample size limitation, the FNS is one of the largest surveys focused on ethnic minority populations, and it provides extensive information on racist victimisation, ethnicity and health, and it is hard to find a publicly available dataset with a similar level of detailed information.

Due to the cross-sectional nature of the data, it is not possible to discern from the results of the study whether living in a low ethnic density area precedes poor health and development of psychosis symptomatology, or vice versa. Nonetheless, Halpern and Nazroo (1999) tested in their study these various possibilities, including social causation, social selection or drift, and acculturation. Based on their findings, they argue that the ethnic density effect found is the result of the benefits of group density, which notably reduce the exposure to racial harassment and provide increased social support from other ethnic minority people.

The self-report measures of health and racism that are used in this study suffer from the same cognitive and social limitations as other self-report variables (Blank et al., 2004; Krieger, 2003; Stone et al., 2000). Notwithstanding, the validity of self-report health measures has been demonstrated by showing their associations with mortality, psychological distress, and poor functioning (Idler & Benyamini, 1997; Wannamethee & Shaper, 1991; Miilunpalo, Vuori, Oja, Pasanen & Urponen, 1997; Farmer & Ferraro, 1997; Krause & Jay, 1994). Similar assessments of the measures of experienced

discrimination employed in this study are not possible, but measures such as these have been used in a number of other studies exploring the impact of racism on health (Halpern & Nazroo, 1999; Karlsen & Nazroo, 2002; Karlsen, Nazroo & Stephenson, 2002, Karlsen et al., 2005, Harris et al., 2006, Nazroo et al., 2007).

Ethnic density was defined as the proportion of co-ethnics living in the respondent's ward. It is possible that a different definition of ethnic density, including other characteristics such as shared language, nativity and immigration status might also be useful in deciphering the protective effects of living amongst one's own. However, such data was not available at the area level, and thus analyzing these differing definitions are beyond the scope and purpose of this paper.

The present study proposed a theoretical 'buffering effect model' of ethnic density but other mediating pathways are plausible, including decreased low status stigma (Pickett & Wilkinson, 2008), and increased social support or political mobility in areas of higher own ethnic density. These will be explored in future work.

In summary, this study provides some initial support for the hypothesis that the effect of interpersonal racism on general and mental health is weaker in areas with a greater proportion of co-ethnics. Reduced exposure to and reduced health impact of interpersonal racism may contribute to explaining the ethnic density effect. Findings should be confirmed in other datasets to explore and disentangle the ethnic density effect on health.

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Table 1. Descriptive characteristics of the FNS sample

Unweighted n	**White** (n=2980) %	**Caribbean** (n=1 215) %	**Indian** (n =1278) %	**Pakistani** (n =1190) %	**Bangladeshi** (n =594) %
Sex					
Male	45	45	47	51	55
Female	55	55	53	49	45
Age M(SD)	45(18)	39(16)	37(16)	35(14)	35(15)
Registrar´s class					
I	3	2	4	2	1
II	20	16	15	7	3
IIIn	18	18	14	6	7
IIIm	15	20	11	13	11
IV	11	19	20	14	16
V	4	6	3	2	2
Missing	29	19	32	56	61
ACORN					
Wealthy Achievers	24	4	13	2	2
Urban Prosperity	12	13	9	7	9
Comfortably Off	42	27	31	20	17
Moderate Means	14	17	11	14	12
Hard-Pressed	8	39	36	57	60
Caribbean ethnic density					
0% - 0.9%	83	11	21	31	12
1% - 4.9%	13	26	55	47	54
5% - 9.9%	2	25	13	13	21
10% - 19.9%	2	32	10	9	13
20% or more	0	6	1	0	0
Indian ethnic density					
0% - 0.9%	81	25	10	28	25
1% - 4.9%	15	36	20	32	47
5% - 9.9%	1	20	23	20	11
10% - 19.9%	2	10	27	13	11
20% or more	1	9	20	7	6
Pakistani ethnic density					
0% - 0.9%	91	55	49	10	41
1% - 4.9%	8	24	23	15	29
5% - 9.9%	0	13	18	27	11
10% - 19.9%	1	5	7	20	11
20% or more	0	3	3	28	8
Bangladeshi					

ethnic density					
0% - 0.9%	98	69	93	61	25
1% - 4.9%	2	26	13	31	25
5% - 9.9%	0	4	4	6	14
10% - 19.9%	0	1	0	2	9
20% or more	0	0	0	0	27
Experiences of racism in the past year					
Any racist event					
No	-	86	89	88	93
Yes	-	14	11	12	7

Table 2. Association between ethnic density and experiences of racism. Odds ratios of experiencing racism per 10% increase in ethnic density are shown.

	All ethnic minorities		Caribbean		Indian		Pakistani		Bangladeshi	
	O.R.	*95% C.I.*	*O.R.*	*95% C.I.*	*O.R.*	*95% C.I.*	*O.R.*	*95% C.I.*	*O.R.*	*95% C.I.*
Any experienced racism										
Effect of ethnic density (unadjusted)	0.91	0.86-0.95†	0.77	0.60-0.99*	0.97	0.82-1.15	0.82	0.70-0.96*	0.62	0.45-0.83**
Effect of ethnic density adjusted for age, sex, individual SES & area deprivation	0.91	0.86-0.97**	0.78	0.60-1.02	1.04	0.85-1.27	0.84	0.69-1.00	0.60	0.44-0.83**

*p<0.05, **p<0.01, †p<0.001

Table 3. Association between experienced interpersonal racism and health outcomes.

	All ethnic minorities		Caribbean		Indian		Pakistani		Bangladeshi	
	O.R.	*95% C.I.*	*O.R.*	*95% C.I.*	*O.R.*	*95% C.I.*	*O.R.*	*95% C.I.*	*O.R.*	*95% C.I.*
Psychotic symptomatology (PSQ)										
Effect of racism (unadjusted)	3.24	2.62-4.01†	3.54	2.40-5.24†	4.30	2.76-6.70†	1.38	0.83-2.29	1.46	0.48-4.41
Effect of racism adjusted for age, sex, individual SES & area deprivation	3.13	2.52-3.89†	3.47	2.34-5.15†	4.15	2.62-6.56†	1.26	0.75-2.11	1.24	0.45-3.45
Overall Self-Rated Poor or Very Poor Health										
Effect of racism (unadjusted)	1.24	1.01-1.54*	0.83	0.56-1.23	1.75	1.14-2.69**	1.28	0.85-1.95	1.43	0.63-3.22
Effect of racism adjusted for age, sex, individual SES & area deprivation	1.81	1.41-2.31†	1.24	0.79-1.94	2.89	1.77-4.71†	1.71	1.09-2.66**	3.05	1.08-8.59*

*p<0.05, **p<0.01, †p<0.001

Table 4. Regression results of the association between ethnic density (10% increase), racism and psychotic symptomatology (PSQ) in ethnic minority people

	Racism effect		Ethnic density effect		Interaction effect between racism and ethnic density	
	Partially Adjusted[a] O.R (95% CI)	Fully Adjusted[b] O.R (95% CI)	Partially Adjusted O.R (95% CI)	Fully Adjusted O.R (95% CI)	Partially Adjusted O.R (95% CI)	Fully Adjusted O.R (95% CI)
Overall ethnic minority	3.19 (2.57-3.95)†	3.69 (2.61-5.24)†	0.96 (0.92-0.99)*	0.99 (0.94-1.04)	0.94 (0.84-1.04)	0.93 (0.84-1.03)
Caribbean	3.47 (2.33-5.16)†	3.61 (1.88-6.92) †	0.89 (0.74-1.08)	0.83 (0.66-1.04)	0.98 (0.54-1.78)	0.93 (0.52-1.66)
Indian	4.15 (2.67-6.44)†	5.51 (2.83-10.70) †	0.85 (0.74-0.99)*	0.90 (0.76-1.08)	0.84 (0.57-1.24)	0.80 (0.53-1.22)
Pakistani	1.32 (0.79-2.20)	1.81 (0.86-3.82)	1.22 (1.07-1.39)**	1.44 (1.23-1.69) †	0.81 (0.54-1.22)	0.80 (0.54-1.19)
Bangladeshi	1.46 (0.47-4.51)	2.09 (0.52-8.45)	0.77 (0.60-0.99)*	0.81 (0.62-1.06)	0.13 (0.004-3.35)	0.16 (0.02-1.53)

*p<0.05, **p<0.01, †p<0.001

[a]adjusted for age and sex

[b]fully adjusted model includes sex, age, individual socioeconomic position, area deprivation, ethnic density, racism, and the interaction between racism and ethnic density

Table 5. Regression results of the association between ethnic density (10% increase), racism and fair, poor or very poor self-rated health in ethnic minority people

	Racism effect		Ethnic density effect		Interaction effect between racism and ethnic density	
	Partially Adjusted[a] O.R. (95% CI)	Fully Adjusted[b] O.R. (95% CI)	Partially Adjusted O.R. (95% CI)	Fully Adjusted O.R. (95% CI)	Partially Adjusted O.R. (95% CI)	Fully Adjusted O.R. (95% CI)
Overall ethnic minority	1.67 (1.31-2.12)†	1.82 (1.24-2.68)**	1.03 (0.99-1.06)	0.99 (0.95-1.03)	0.99 (0.88-1.11)	0.99 (0.89-1.11)
Caribbean	1.14 (0.73-1.78)	0.90 (0.43-1.91)	1.18 (0.98-1.43)	1.10 (0.88-1.37)	1.42 (0.75-2.67)	1.51 (0.79-2.87)
Indian	2.33 (1.46-3.73)†	3.33 (1.74-6.37)†	1.01 (0.91-1.13)	1.00 (0.88-1.14)	0.90 (0.65-1.26)	0.90 (0.64-1.27)
Pakistani	1.62 (1.05-2.50)*	1.99 (1.06-3.71)*	1.06 (0.95-1.18)	0.97 (0.84-1.11)	0.87 (0.61-1.24)	0.87 (0.60-1.25)
Bangladeshi	2.87 (0.92-9.07)	3.26 (0.73-14.53)	1.03 (0.91-1.16)	1.01 (0.88-1.17)	0.84 (0.26-2.68)	0.91 (0.29-2.79)

*p<0.05, **p<0.01, †p<0.001

[a]adjusted for age and sex

[b]fully adjusted model includes sex, age, individual socioeconomic position, area deprivation, ethnic density, racism, and the interaction between racism and ethnic density

Figure 1. Odds ratios of reporting psychotic symptomatology with increasing ethnic density among people who have experienced interpersonal racism, relative to those who have not

Estimates for Bangladeshi people not shown due to unreliable estimates produced from small sample size
Ethnic density levels are as follows: lowest, 1%; low, 10%; high, 20%; highest, 40%. Due to the different degree of density between ethnic groups, Caribbean density is shown at 0.5%, 5%, 10% and 20%.

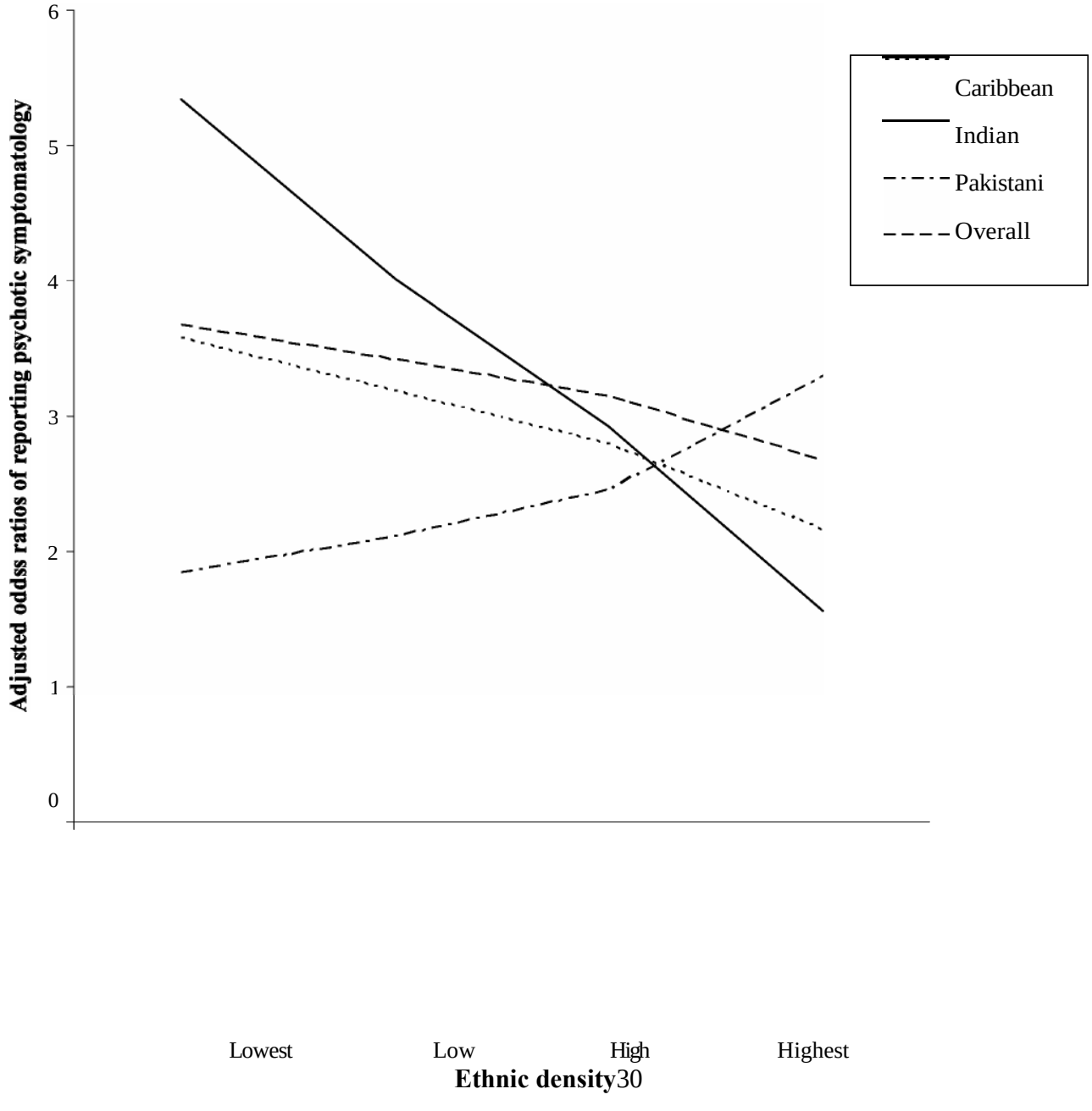

Figure 2. Odds ratios of reporting fair, poor or very poor health with increasing ethnic density among people who have experienced interpersonal racism, relative to those who have not

Ethnic density levels are as follows: lowest, 1%; low, 10%; high, 20%; highest, 40%. Due to the different degree of density between ethnic groups, Caribbean density is shown at 0.5%, 5%, 10% and 20%.