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Ethnic density and first episode psychosis in the British Pakistani population: findings from the East Lancashire Early Intervention Service

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Background

Elevated risk of psychosis for ethnic minority groups has generally been shown to be mitigated by high ethnic density. However, past survey studies examining UK Pakistani populations have shown an absence of protective ethnic density effects, which is not observed in other South Asian groups.

Aims

To assess the ethnic density effect at a local neighbourhood level, in the UK Pakistani population in East Lancashire.

Method

Data was collected by the East Lancashire Early Intervention Service, identifying all cases of first episode psychosis (FEP) within their catchment area between 2012 and 2020. Multilevel Poisson regression analyses were used to compare incidence rates between Pakistani and White majority groups, while controlling for age, gender and area-level deprivation. The ethnic density effect was also examined by comparing incidence rates across high and low density areas.

Results

A total of 455 cases of FEP (364 White, 91 Pakistani) were identified. The Pakistani group had a higher incidence of FEP compared to the White majority population. A clear effect of ethnic density on rates of FEP was shown, with those in low density areas having higher incidence rates compared to the White majority, whereas incidence rates in high density areas did not significantly differ. Within the Pakistani group, a dose-response effect was also observed, with risk of FEP increasing incrementally as ethnic density decreased.

Conclusions

Higher ethnic density related to lower risk of FEP within the Pakistani population in East Lancashire, highlighting the impact of local social context on psychosis incidence.

Keywords

Transcultural psychiatry; psychotic disorders/schizophrenia; ethnic density; ethnic minorities; first episode psychosis.

It has been consistently shown that certain ethnic minority groups are at greater risk of psychotic disorders when compared to majority populations.[1] In the UK, incidence rates of severe mental illnesses such as psychosis are elevated for those from Black African or Caribbean backgrounds and, albeit less prominently, for South Asian populations.[2] Such disparities have not been adequately explained by factors such as substance use, misdiagnosis, cultural bias in assessment,[3] socioeconomic status[4] or migration status.[5] Instead, these effects have been argued to stem from social factors such as ethnic and social identities that are discrepant with majority identities,[6,7] and experience of adversities such as discrimination, disadvantage and hostility.[8,9]

The ethnic density effect

Highlighting the potential benefits that social context can offer for buffering against the risk of psychosis, it has been found that living in areas with a higher proportion of people from one's own ethnic minority group can protect against risk of psychosis and other mental health issues.[10] This has been described as the ethnic density effect.[11] Living amongst neighbours belonging to the same ethnic group may provide this protective effect by reducing or protecting against experiences of interpersonal discrimination and social exclusion,[12,13] and by increasing levels of mutual support.[14,15]

There appears to be significant heterogeneity for the ethnic density effect on psychosis across different ethnic minority groups.[16] Whereas the protective effects of ethnic density have been demonstrated generally, and particularly for Black African and Caribbean groups, there has been contradictory evidence from community surveys of Pakistani people living in the UK, which does not appear to be the case in other South Asian populations.[17] Studies have found a lack of protective effects as ethnic density increases for Pakistani groups.[13–15] It is unclear why an absence of protective effects of ethnic density might be observed in an ethnic minority population, and also why ethnic density effects for the Pakistani population contrasts with other South Asian populations in the UK, particularly Indian and Bangladeshi groups.

Research conducted to date exploring ethnic density and rates of psychosis in the UK Pakistani population may be limited by methodological issues such as reliance on positive responses to retrospective screening measures, which may differ from clinically relevant experiences of psychosis.[18] Indeed, studies using clinical outcomes appear to detect stronger ethnic density associations than studies using subclinical screening measures.[16] Some studies have also measured ethnic density at a broader 'electoral ward' level using the UK Census,[13,14] which has been shown to obscure ethnic density effects when compared to using more detailed local neighbourhood-level data, such as Lower Super Output Areas (LSOAs) which cover an average population of 1500 people and provide data with greater historical continuity and socioeconomic homogeneity.[19] It is therefore important to explore the ethnic density effect in the UK Pakistani population using clinically relevant outcomes, at a more detailed local neighbourhood level.

Aims

The current study aimed to examine the ethnic density effect for Pakistani people in the UK using a clinically relevant sample, with

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ethnic density measured at the LSOA level. Data collected by an Early Intervention Service in East Lancashire recording incidents of first episode psychosis (FEP) was used for this purpose, allowing comparison between Pakistani and White majority groups. It was predicted that the Pakistani group would have higher incidence rates of FEP when compared to the White majority group, after controlling for age, gender and area-level deprivation. It was also predicted that the comparative risk of FEP would be reduced for Pakistani people in areas of higher own ethnic density, demonstrating an ethnic density effect.

Method

Design and setting

The East Lancashire Early Intervention Service (EIS) is one of the three early intervention teams operated by Lancashire Care & South Cumbria NHS Foundation Trust, with a catchment area covering five Local Authority Districts (Burnley, Hyndburn, Pendle, Ribble Valley and Rossendale), and one Unitary Authority Area District (Blackburn with Darwen), with a total population of 529 848 as of the 2011 UK Census. Across the districts, the proportion of Pakistani residents (ethnic density) ranges from 0.52% in Ribble Valley to 17.13% in Pendle, but ethnic density varies much more substantially at the LSOA level, with a range from 0 to 73% (see Fig. 1). The EIS remit is to support those with FEP to achieve the best possible long-term recovery. The service works with people aged between 14 and 65 years, who are residents or registered with a GP in the listed districts, who are presenting with psychosis symptoms for the first time or who are within their first 3 years of commencing treatment.

Case ascertainment and primary outcome

The EIS identified all people referred to the service with suspected FEP over a 9-year period (2012–2020). The service receives referrals through an extensive range of sources, including primary, secondary and tertiary care services and self-referrals, and through other agencies where referral pathways are established. General practitioners are advised to refer those below the age of 16 years to local Child and Adolescent Mental Health Services. After initial screening, referrals are assessed by a trained clinician within the team. Presence of FEP outcome is determined by the team based upon symptomology and need for treatment, which are informed using clinical instruments including the Positive and Negative Syndrome Scale (PANSS)[20] and the Comprehensive Assessment of At-Risk Mental States (CAARMS).[21] The service triages people into two groups: those who present with a FEP; and individuals who have 'At-Risk Mental States' (ARMS), consisting of those who are at risk of transitioning to psychosis. Exclusion criteria for the service include: those whose symptoms only occurred during acute intoxication or withdrawal states, symptoms occurring as part of an organic disorder, moderate or severe learning disability, and those who have received previous treatment for psychosis over 3 years before.

Measures

Individual-level variables

Sociodemographic information is routinely collected by the service, including age, gender, last known postcode and self-reported ethnicity (using categories outlined in the UK Census 2011). For the current study, those who reported their ethnicity as Pakistani were compared with those in the White majority category. Postcodes were used to link participants to corresponding Lower Super Output Areas.

Area-level variables

Ethnic density was calculated using ethnic group population statistics from the 2011 Census in England and Wales. We divided the total number of Pakistani residents within each LSOA by the overall LSOA population in 2011 to generate a percentage measure of ethnic density, with a higher percentage indicating a higher relative proportion of Pakistani residents. Deprivation was also calculated for each LSOA using the 2015 Index of Multiple Deprivation (IMD),[22] which provides an overall score of relative deprivation over seven different domains (income deprivation; employment deprivation; education, skills and training deprivation; health deprivation and disability; crime; barriers to housing and services; and living environment deprivation) for each of the 32 844 LSOAs in England. Scores range between 0.48 and 92.60, with a higher score indicating higher relative deprivation.

Analysis

Rates of FEP were modelled over the 9-year period using the 'mepoisson' function for mixed effects multilevel Poisson regression in STATA 14 for Windows, taking into account the two-level structure of the data (individuals clustered in LSOAs), allowing neighbourhood- and patient-level effects to be modelled simultaneously with cross-level interactions. To obtain count data, individual data were aggregated by age group, gender (male and female) and ethnicity (Pakistani and White), where stratum specific populations from Census 2011 data were used to calculate the underlying population at risk. Initially, unadjusted incidence rate ratios (IRRs) were calculated comparing rates of FEP in the Pakistani and the White populations in East Lancashire. Following this, incidence rates were incrementally adjusted for age and gender, followed by area-level deprivation. We then adjusted for ethnic density, including an interaction term between individual ethnicity and ethnic density, and a neighbourhood-level random intercept with gamma distribution. To further assess the interaction between ethnicity and ethnic density, we first compared IRRs between LSOAs with below average (low) and above average (high) ethnic density, with an average ethnic density of 12.78% across the neighbourhoods. We then looked at the Pakistani group, dividing the LSOAs into equally sized quartiles depending on their relative ethnic density, and compared risk of FEP using the densest quartile as the reference category. The Wald statistic was used to assess statistical significance of all main effects and interactions.

Ethics

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation, and with the Helsinki Declaration of 1975 as revised in 2008. All procedures involving human subjects/patients were approved by the London Central Research Ethics Committee (20/LO/1279).

Consent

Consent was not obtained from participants in the study due to data having been collected for routine clinical purposes, with the number of participants and the length of time elapsed since data were collected, making it practically unfeasible to obtain informed consent for all participants. Approval to use data without consent for the purposes of the study was given by the

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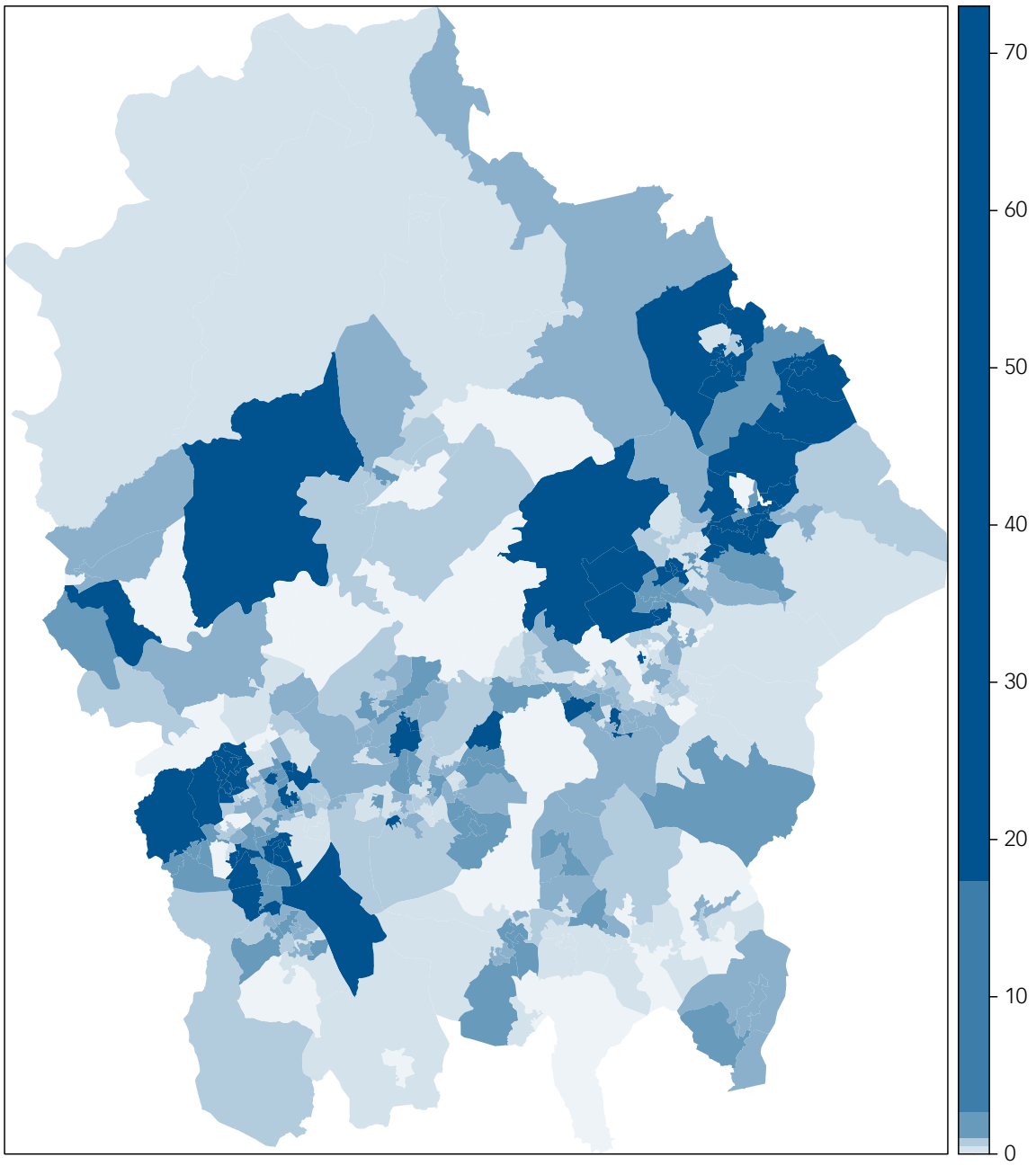

Fig. 1 Percentage ethnic density by Lower Super Output Area for Pakistani populations across East Lancashire, where darker areas indicate higher ethnic density.

London Central Research Ethics Committee (20/LO/1279) and the Health Research Authority Confidentiality Advisory Group (20/CAG/0112).

Patient and public involvement (PPI)

PPI was conducted through two focus groups with members of the Pakistani community in East Lancashire, assessing the relevance, methods and acceptability of the study, as well as issues regarding dissemination. This was particularly necessary due to the use of NHS patient data without consent. The first focus group consisted of a group of patients, some of whom had experience in research. The second group involved community leaders and consisted of imams, teachers, general practitioners and third-sector organisation staff.

This paper has been prepared in line with the Strengthening The Reporting of OBservational studies in Epidemiology (STROBE) statement checklist for the reporting of cross-sectional studies (see Supplementary Table 5 available at https://doi.org/10.1192/bjp.2024.40).[23]

Results

The total sample included 889 patients. Of these, 50 (6%) had last known postcodes which were outside the catchment area and so were excluded. In all, 61 were excluded via the NHS national data opt-out register, leaving a total of 778 patients. Additionally, 113 (14%) participants were excluded due to missing ethnicity data. Of the remaining 665, 575 participants were relevant for the

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current study (473 White, 102 Pakistani), consisting of both ARMS and FEP patients. Ninety participants reported ethnicities from other categories (46 any other ethnic group, 26 any other Asian background, seven Indian, one Bangladeshi, one Black or Black British Caribbean, one Black or Black British African, one African, three mixed White and Asian and four mixed White and Black Caribbean) and were not included in analyses due to limited sample sizes, and possible heterogeneity within the 'any other ethnic group' and 'any other Asian background' categories. Those assessed as ARMS (109 White, 11 Pakistani) were also not included in the main analysis, with equivalent analyses combining both ARMS and FEP outcomes detailed in the Supplementary material (FEP and ARMS Combined Sample Analyses).

For the analysis of FEP, a total of 455 patients (364 White, 91 Pakistani) were included. Of these, 161 were female and 294 were male, with a median age of 26 (range: 13–63) years. The 455 cases of FEP were identified over a total of 614 124 person-years follow-up. A crude FEP incidence rate of 69 per 100 000 person-years was found for the White category, and a rate of 107 per 100 000 person-years for the Pakistani category, with an unadjusted IRR of 1.55 (95% CI 1.14–2.11, $P = 0.005$). Adjusting for age and gender gave an IRR of 1.59 (95% CI 1.19–2.12, $P = 0.002$). The final adjustment for area level deprivation gave an IRR of 1.49 (95% CI 1.11–2.01, $P = 0.009$), showing significantly higher rates of FEP for the Pakistani group relative to the White population in East Lancashire.

Once Pakistani ethnic density was included in the model, a significant interaction between ethnicity and ethnic density was found ($P < 0.001$). In order to examine this interaction, IRRs were compared between areas with high ethnic density and low ethnic density (see Table 1), while adjusting for age, gender and deprivation. In the areas with high ethnic density, incidence rates between the Pakistani and White categories did not significantly differ (IRR 1.03, 95% CI 0.77–1.38, $P = 0.862$). Conversely, in areas of low ethnic density, the Pakistani category had significantly higher rates of FEP compared to that of the White category (IRR 14.09, 95% CI 9.51–20.87, $P < 0.001$).

A further model including only Pakistani patients (see Table 2) in areas of varying ethnic density divided into equally sized quartiles was used to examine the ethnic density effect in more detail. This model shows that those in the lowest density quartile have a markedly higher risk of FEP when compared with those in the highest density quartile (IRR 7.08, 95% CI 3.88–12.92, $P < 0.001$). The Pakistani group also showed higher rates in the second (IRR 2.70, 95% CI 1.97–3.70, $P < 0.001$) and third (IRR 1.57, 95% CI 1.04–2.36, $P = 0.030$) lowest density quartiles compared to the highest density. A pattern can be seen where relative risk of FEP for the Pakistani population increases incrementally as neighbourhood ethnic density decreases, with those in the least dense quartiles showing the highest risk. In contrast, the equivalent model for White patients did not show clear evidence of an ethnic density effect (see Supplementary analyses, Supplementary Table 1). Finally, inclusion of ARMS patients in the analyses did not appear to alter the pattern of the findings (Supplementary FEP and ARMS combined sample analyses, Supplementary Tables 2–4), indicating that an ethnic density effect was present across the combined FEP and ARMS sample.

Discussion

Main findings

The current study is the first to examine the ethnic density effect with a focus on the Pakistani population in the UK, using clinically relevant FEP outcomes derived from NHS early intervention team data. Pakistani people had significantly higher rates of FEP compared to the White majority population, which was not explained by differences in age, gender or area level deprivation. A clear ethnic density effect was demonstrated, with Pakistani people in areas of low ethnic density having a substantially higher risk of FEP when compared with the White majority, whereas no significant difference in incidence rates was observed in areas of high ethnic density. A dose response effect was also shown, with relative risk increasing as ethnic density decreased. Risk was substantially higher for Pakistani people within LSOAs in the lowest ethnic density quartile, compared to the highest density quartile.

The findings contradict past survey research showing no protective effects of ethnic density for Pakistani people in the UK,[17] highlighting differences between clinically significant and screening outcome measures when examining ethnic density effects.[16] Instead, we found similar patterns to previous work examining ethnic density effects using healthcare records for Black and minority ethnic groups in the UK,[19,24] as well as a first-contact study for immigrant ethnic groups in The Hague.[25] Our findings further support suggestions that raised incidence rates of psychosis in ethnic minority groups relate to social factors and context. People from ethnic minority groups in the UK are overall more likely to report experiences of interpersonal racism and victimisation in areas of low ethnic density.[13,14] Social support is also implicated in psychosis,[26] and could contribute to the protective effects of ethnic density by mitigating against experiences of social adversities.[16] Such experiences of discrimination and isolation may impact ethnic minority groups, particularly in low density areas, through the disruption of positive social identity formation,[6] while disempowerment related to identity-based exclusion has been posited to be a primary driver of variation in psychosis rates amongst ethnic minority groups.[27]

Strengths

In addition to the use of a clinically relevant primary outcome measure of FEP, the study benefits from a number of methodological strengths. We were able to test the ethnic density effect and control for area level deprivation at the more detailed LSOA level, with ethnic density effects being shown to be obscured at the broader ward level.[19] There is also a large Pakistani population within the catchment area of East Lancashire, with a wide range of ethnic densities across the different districts and LSOAs; from less than 1% in some areas, to areas where the majority of the population identified as Pakistani (73% Pakistani in the highest ethnic density

Table 1 Incidence of FEP for Pakistani patients compared to White patients in areas of low and high ethnic density

	Incident cases/person-years at risk			
Ethnic density	Pakistani	White	Adjusted IRR[a]	95% CI
Low (0–12.78%)	15/1737	298/462 150	14.09***	9.51–20.87
High (12.79–73%)	76/83 457	66/150 849	1.03	0.77–1.38

a. Adjusted for age, gender and area level deprivation. IRR, incidence rate ratio.
***$P < 0.001$.

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Table 2 Model assessing factors associated with incidence rates of FEP in Pakistani patients ($n = 91$)

Variable	Adjusted IRR[a]	95% CI
Gender (female = 0/male = 1)	1.01	0.78–1.30
Age	1.57*	1.22–2.02
Area deprivation (IMD)	1.00	0.99–1.01
Ethnic density quartile		
4th quartile (most dense: 61.52%)	–	–
3rd quartile (40.54%)	1.57*	1.04–2.36
2nd quartile (22.33%)	2.70***	1.97–3.70
1st quartile (least dense: 6.36%)	7.08***	3.88–12.92

a. Adjusted for age, gender and area level deprivation. IRR, incidence rate ratio; IMD, Index of Multiple Deprivation.
* $P < 0.05$, *** $P < 0.001$.

LSOA). This enabled us to examine the ethnic density effect across a range of different social contexts. We were also able to examine ethnic density effects for the White majority population in East Lancashire which, in contrast to the Pakistani population, did not show clear evidence of an ethnic density effect. This suggests that the protective effects of own-group ethnic density may relate specifically to ethnic minority groups in the UK in relation to FEP outcome.

Limitations

Certain methodological limitations need to be acknowledged. Firstly, we did not control for experiences such as racism, discrimination or social support. Such social adversities are potential causal factors in relation to the high rates of psychosis in ethnic minority groups,[8] and future work should endeavour to directly examine the degree to which adverse social contexts may explain ethnic density effects. There was also no assessment of individual level deprivation or socioeconomic status, and so it is possible that those in more affluent neighbourhoods could still have faced high degrees of deprivation, or *vice versa*. Additionally, we did not account for generational differences. Ethnic density effects have been shown to differ between first- and second-generation migrants in some ethnic groups in a Danish population cohort study,[28] and it is possible such differences could have been apparent in our sample, though previous studies in the UK did not find any interactions between generation and ethnic density effects.[15] Considering the complexity of capturing ethnic identity, particularly for mixed identities, it remains unclear how certain identities are captured within the census categories, and so our analyses were restricted to those who self-reported within the Pakistani category.

Importantly, the number of incident cases identified in the study was relatively low, particularly for the Pakistani population, despite the 9-year study period. It is possible that our findings could be influenced by cases from particularly low density areas, or by potential underrepresentation of small area populations within the 2011 Census. Thus, the findings should be interpreted with some caution. Future studies would benefit from combining samples across multiple sites in the UK to account for the relatively rare occurrence of FEP within ethnic minority populations.

The use of current postcodes to map participants to LSOAs means that we were not able to take into account how long people had been resident in their respective LSOAs, and that people may have recently moved between LSOAs of varying ethnic density and deprivation, or moved out of the catchment area. Furthermore, the calculation of area-level variables relies upon population statistics collected at a single time point, and therefore represent estimations of what are, in reality, constantly changing population characteristics. For example, incidence rates of psychosis for Black African and Caribbean groups in South London have been shown to change over time, relating in part to shifts in the local resident populations.[29] Finally, some of those experiencing psychosis may not have come into contact with Early Intervention services within the catchment area. However, considering the institutional and cultural barriers to mental healthcare access for South Asian groups in the UK,[30] it may be that comparative rates of FEP in the Pakistani population could be underestimated in the current study.

Implications

These findings highlight the role of adverse social environments when it comes to understanding risk of psychosis in ethnic minority groups. The importance of focusing on specific ethnic groups, and the social characteristics of people's immediate locality, both in terms of clinical work and future research, is also apparent. There is a need to target support and intervention at the local community level, and for continued community engagement with those from at-risk populations in order to best shape the provision of mental health services for the benefit of people from ethnic minority groups. Further work exploring the experiences of Pakistani people who develop psychosis is also needed to clarify the mechanisms underlying the ethnic density effect. Directly examining factors such as experiences of discrimination, exclusion and identity will likely provide benefits in this regard, as well as for clinicians working to support people from ethnic minority backgrounds. Wider societal issues encompassing racism, discrimination, and disparities in mental health outcomes and access to services are also highlighted.

Conclusion

Rates of psychosis appear to be raised in the Pakistani population when compared to the White majority population in East Lancashire at the LSOA level, using data collected by an NHS Early Intervention Service. Ethnic density was also clearly associated with increased risk of psychosis, with Pakistani people from lower density areas having a substantially higher risk of FEP compared to those in areas with the highest ethnic density. These findings show the negative impacts that social context can have on ethnic minority groups and emphasise the need to address societal inequalities in the prevention of psychotic disorders.

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Supplementary material

Supplementary material is available online at https://doi.org/10.1192/bjp.2024.40

Data availability

Deidentified study data (.dta files) and metadata, alongside the study data analysis code (.do) files, are openly available via the Liverpool Data Catalogue (https://doi.org/10.17638/datacat.liverpool.ac.uk/2579) and will remain accessible for 10 years following the publication date.

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Author contributions

R.P.B., R.G.W., N.H., M.Q. and R.Q. contributed to the conceptualisation of the study and the study methodology. N.H. and M.Q. were part of the clinical multidisciplinary team and had input into assessment feedback, but did not carry out direct clinical assessment. R.G.W., N.H. and R.P.B. supervised the study. R.G.W. and V.V. acted as chief investigators during the study. M.Q., K.B. and R.Q. curated the data. R.Q. carried out formal statistical analysis and drafted the article. M.Q., K.B., R.Q. and V.V. accessed and verified the data. All authors had full access to the data used in the study and aided in the interpretation of the findings. All authors also provided critical revisions to the manuscript, approved the final draft for submission and had final responsibility for the decision to submit for publication.

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Declaration of interest

N.H. has been a past Trustee of the Pakistan Institute of Living and Learning (PILL), Abaseen Foundation UK, Lancashire Mind UK and Manchester Global Foundation (MGF). He is an executive member of the Academic Faculty at the Royal College of Psychiatrists (RCPsych), London. He is a National Institute for Health and Care Research (NIHR) Senior Investigator. He has attended educational events organised by various pharmaceutical industries. All other authors declare no competing interests.

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