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# Incidence of schizophrenia and other psychoses in ethnic minority groups: results from the MRC AESOP Study

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## ABSTRACT

**Background.** The incidence of schizophrenia in the African-Caribbean population in England is reported to be raised. We sought to clarify whether (*a*) the rates of other psychotic disorders are increased, (*b*) whether psychosis is increased in other ethnic minority groups, and (*c*) whether particular age or gender groups are especially at risk.

**Method.** We identified all people ($n = 568$) aged 16–64 years presenting to secondary services with their first psychotic symptoms in three well-defined English areas (over a 2-year period in Southeast London and Nottingham and a 9-month period in Bristol). Standardized incidence rates and incidence rate ratios (IRR) for all major psychosis syndromes for all main ethnic groups were calculated.

**Results.** We found remarkably high IRRs for both schizophrenia and manic psychosis in both African-Caribbeans (schizophrenia 9·1, manic psychosis 8·0) and Black Africans (schizophrenia 5·8, manic psychosis 6·2) in men and women. IRRs in other ethnic minority groups were modestly increased as were rates for depressive psychosis and other psychoses in all minority groups. These raised rates were evident in all age groups in our study.

**Conclusions.** Ethnic minority groups are at increased risk for all psychotic illnesses but African-Caribbeans and Black Africans appear to be at especially high risk for both schizophrenia and mania. These findings suggest that (*a*) either additional risk factors are operating in African-Caribbeans and Black Africans or that these factors are particularly prevalent in these groups, and that (*b*) such factors increase risk for schizophrenia and mania in these groups.

## INTRODUCTION

An elevated incidence of schizophrenia in African-Caribbean populations living in England is a well replicated, yet contentious finding (Fernando, 1998). Less is known about whether these increased rates exist to the same extent for other psychotic disorders and in other ethnic minority groups, including non-British Whites. If the raised incidence is a genuine phenomenon, it presents an urgent need in terms of individual and public health, as well as a

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remarkable opportunity to explore some of the causes of the schizophrenia syndrome.

The AESOP (Aetiology and Ethnicity of Schizophrenia and Other Psychoses) study was designed to investigate these phenomena, using a large-scale, multi-centre epidemiological design. Our three primary objectives in the first stage of the study were:

(1) to define the degree of any increased incidence of schizophrenia in the African-Caribbean population in England;
(2) to explore the specificity of this phenomenon in terms of other psychotic syndromes;
(3) to determine whether the incidence of schizophrenia and other psychoses is raised in other ethnic minority groups.

## METHOD

The AESOP study was a population-based incidence survey of all people with any psychosis contacting health services from a defined population during a 2-year period. The study was based upon the methodology of the World Health Organisation (WHO) ten-country study (Jablensky *et al.* 1992), with additional features to reduce biases associated with ethnicity in both population at risk and in case ascertainment.

### Population at risk

The study took place in three areas in England: Southeast London, Nottingham and Bristol. Each has long-established African-Caribbean populations as well as other ethnic minority groups. Populations were estimated according to the 2001 Census, with tables commissioned from the Office of National Statistics stratified by age (5-year age-bands), sex and ethnicity. Self-ascription of ethnicity in this Census was according to the categories of: White British, White Irish, White Other, Mixed (four groups), Black Caribbean, Black African, Black Other, Indian, Pakistani, Bangladeshi, Chinese, Asian Other, and Other. We collapsed these groups into the following seven groups: White British, African-Caribbean (Black Caribbean & Black Other), Black African, Asian (Indian, Pakistani, Bangladeshi), Other (Chinese, Asian Other, Other), Mixed and White Other. The 2001 Census defined an African-Caribbean as a person who was born in the Caribbean, or whose family originated there. Similarly, Black African was defined as a person either born in sub-Saharan Africa or whose family hailed from that region. We adhered to these definitions in our ethnicity ascription in the AESOP study.

In Southeast London 33 adjacent electoral wards served by the South London & Maudsley Trust contained 282 788 people between the ages of 16 and 64 years; in Nottingham, 95 wards containing 404 208 people aged 16–64 were also served by a single mental health provider, Nottingham Healthcare Trust; in Bristol, 52 wards included 342 806 people between the ages of 16 and 64 years, served by the Avon Mental Health Trust. These populations were considered to be at risk for 24 months in Southeast London & Nottingham from September 1997 until the end of August 1999, and for the first 9 months of this period in Bristol. Thus, the study was based upon an estimated total of 1·6 million person-years at-risk between the ages of 16 and 64 years.

### Initial screening criteria

The initial target group for the study was people in the populations at-risk who presented to psychiatric services for the first time during the study period with evidence of the following: delusions, hallucinations, thought disorder or negative symptoms of schizophrenia, irrespective of cause.

### Subjects with psychosis

All mental health services serving the relevant areas took part in the study, both in-patient and community-based facilities. Cases were ascertained through two routes. First, routine case ascertainment was conducted through on-going liaison between the study teams in each centre and the mental health services. Clinical staff were encouraged to refer all people who met the initial screening criteria to the study offices using a variety of agreed routes including telephone, 24-hour answering services, postal pro-forma and dedicated fax returns. There was regular phone or face-to-face contact by study teams with both the in-patient and community mental health teams (including child and adolescent services) serving the populations at risk. Regular training events for clinical teams ensured that all staff knew about AESOP,

regardless of staff turnover. Advertising materials were made available in all clinical areas to ensure awareness and continuation of referrals, and presentations were made to user and carer groups within the relevant areas. Secondly, a 'leakage study' was undertaken following the case ascertainment period in Southeast London and Nottingham to identify any cases missed through the routine procedures. All electronic and paper information systems were scrutinized for any cases aged 16–64 years presenting to the services for the first time with the following diagnostic codes, according to ICD-10 (WHO, 1993), routinely used in the UK National Health Service: F1x.04; F1x.5; F1x.7; F20–29; F30–31·9; F32–33. These data were corroborated with case records to confirm eligibility.

### Data collection from eligible subjects

Those subjects identified were approached by the research team. Following explanation and consent, data were collected through interview, in as many interviews as were required.

#### *Instruments*

Psychopathology was assessed using the PSE SCAN interview version 2.0 (WHO, 1992). Psychopathology information on those subjects who could not be interviewed was compiled following thorough case-note review and employing the Item Group Checklist (IGC) of the SCAN. Sociodemographic information was obtained using a specially designed questionnaire, particularly with respect to accurate recording of ethnicity to closely mirror the 2001 Census categories. Age at onset was defined as the age, to the nearest year, at which someone passed the initial screen. Ethnicity was ascribed independently by three researchers (P.F., J.B.K., C.M.), with discrepant cases ($n=34$) resolved by consensus with a principal investigator (PBJ). Inter-rater reliability was high (kappa 0·91). We used all available information, including self-ascription, place of birth and place(s) of parental birth. The principal source of information was self-ascription of ethnicity; when this was unavailable, other information sources, such as other informants and case-notes were used.

#### *Diagnosis*

The clinical assessor prepared clinical vignettes which summarized the presenting complaints and initial history. These vignettes, together with all available clinical information including SCAN interview or IGC for those who had not consented to interview, were presented, blind to ethnicity, to a group of clinicians who made consensus diagnoses according to ICD-10 criteria. These consensus diagnostic groups met at each site throughout the duration of the study, and included at least one Principal Investigator and experienced diagnostician, and the clinical assessor. Inter-rater and inter-centre reliability results for this procedure based on 20 cases were satisfactory with kappa scores ranging between 0·63 and 0·75.

#### *Ethics*

Ethical approval was granted from the local research ethical committees at each site.

#### *Statistical analysis*

The basic characteristics of the datasets – such as age and sex distribution of both the numerator and denominator – were examined, to check for internal consistency of the data. Incidence rates (age-standardized using the population of England and Wales) of overall psychotic illness, schizophrenia (F20), manic psychosis (F30–31), depressive psychosis (F31–32), and 'Other Psychoses' (F10–19 and F21–29) were calculated for each ethnic group using direct standardization. Age- and sex-specific incidence rates were also calculated.

Unadjusted incidence rate ratios were calculated and then adjusted for the potential confounders of age at first contact of service (as a categorical 10-item 'ageband' variable) and sex, using Poisson regression. The analysis was carried out using the 'xi:poisson' command in STATA 6 (StataCorp, 1999). Age and sex-specific incidence rate ratios (IRR) were also calculated. Finally, we tested for an interaction between study area and ethnicity by comparing a model fitted first with, then without, a specific interaction term using the likelihood ratio test.

## RESULTS

Across the three centres, 568 cases of psychosis met our inclusion criteria and were given a consensus diagnosis of psychotic illness during over 1·6 million person-years of follow-up of more than 5% of the relevant English

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Table 1. *Age-standardized incidence rates (95% confidence intervals) for each diagnostic category in all ethnic groups*

| | All psychosis (F20–33) | Narrow schizophrenia (F20) | Manic psychosis (F30–31) | Depressive psychosis (F32–33) | Other psychosis (F10–29) |
|---|---|---|---|---|---|
| All | | | | | |
| White British | 20·2 (17·8–22·7) | 7·2 (5·8–8·7) | 2·2 (1·4–3·0) | 3·6 (2·5–4·7) | 7·2 (5·7–8·7) |
| African-Caribbean | 140·8 (114·4–167·2) | 70·7 (51·6–89·8) | 15·5 (7·7–23·2) | 12·3 (4·3–20·3) | 42·3 (27·8–56·9) |
| Black African | 80·6 (60·0–101·2) | 40·3 (26·7–53·9) | 12·3 (5·3–19·3) | 6·3 (1·2–11·3) | 21·8 (8·9–34·7) |
| Asian | 31·6 (16·7–46·5) | 11·3 (2·4–20·2) | 4·6 (0·1–9·1) | 10·1 (1·8–18·3) | 5·7 (0·0–13·1) |
| Other | 55·0 (30·9–79·1) | 24·9 (9·7–40·2) | 8·2 (0·0–18·5) | 18·5 (4·4–32·7) | 3·3 (0·0–9·8) |
| Mixed | 45·9 (26·4–65·5) | 15·3 (4·2–26·4) | 12·2 (2·3–22·0) | 10·9 (0·7–21·1) | 7·5 (0·0–15·2) |
| White Other | 33·1 (22·0–44·2) | 17·6 (9·9–25·3) | 3·5 (0·3–6·7) | 4·1 (0·2–7·9) | 8·0 (1·8–14·2) |
| Males | | | | | |
| White British | 24·9 (21·1–28·7) | 9·9 (7·5–12·3) | 2·2 (1·1–3·3) | 3·1 (1·7–4·5) | 9·8 (7·4–12·1) |
| African-Caribbean | 148·1 (107·2–189·0) | 83·2 (52·7–113·8) | 11·8 (1·4–22·2) | 7·2 (0·0–15·3) | 45·9 (22·1–69·8) |
| Black African | 98·0 (65·6–130·3) | 49·2 (29·0–69·4) | 15·4 (3·9–26·9) | 5·9 (0·0–12·7) | 27·4 (5·9–48·9) |
| Asian | 28·7 (11·2–46·2) | 6·3 (0·0–13·4) | 6·8 (0·0–14·6) | 13·1 (0·0–26·3) | 2·5 (0·0–7·3) |
| Other | 64·1 (28·1–100·2) | 36·3 (10·0–62·5) | No cases | 27·9 (3·2–52·6) | No cases |
| Mixed | 54·7 (25·3–84·2) | 24·1 (3·9–44·2) | 16·8 (0·1–33·5) | 10·9 (0·0–23·2) | 3·0 (0·0–8·8) |
| White Other | 41·7 (24·6–58·8) | 25·8 (12·3–39·4) | 2·5 (0·0–6·0) | 8·2 (0·4–16·0) | 5·2 (0·0–11·2) |
| Females | | | | | |
| White British | 15·6 (12·5–18·8) | 4·6 (2·9–6·2) | 2·2 (1·1–3·4) | 4·1 (2·5–5·8) | 4·7 (3·0–6·4) |
| African-Caribbean | 113·7 (100·1–167·3) | 58·4 (35·4–81·5) | 19·1 (7·7–30·6) | 17·3 (3·8–30·9) | 38·8 (21·9–55·7) |
| Black African | 63·6 (38·0–89·3) | 31·5 (13·3–49·8) | 9·2 (1·1–17·2) | 6·6 (0·0–14·0) | 16·4 (2·0–30·7) |
| Asian | 34·5 (10·5–58·4) | 16·1 (0·0–32·3) | 2·4 (0·0–7·0) | 7·0 (0·0–17·2) | 8·9 (0·0–22·6) |
| Other | 46·0 (13·9–78·0) | 13·8 (0·0–29·6) | 16·2 (0·0–36·6) | 9·3 (0·0–23·3) | 6·6 (0·0–19·5) |
| Mixed | 37·3 (11·5–63·1) | 6·8 (0·0–16·4) | 7·6 (0·0–18·1) | 10·9 (0·0–27·2) | 12·0 (0·0–26·0) |
| White Other | 24·7 (10·6–38·8) | 9·4 (2·0–16·9) | 4·5 (0·0–9·9) | No cases | 10·7 (0·0–21·4) |

population (Kirkbride *et al.* 2006). Three hundred and eight cases were diagnosed in Southeast London (over 2 years), 203 in Nottingham (over 2 years), and 57 in Bristol (over 9 months).

Table 1 displays the combined age-standardized incidence rates for each group for each diagnostic category in both males and females and both sexes combined. African-Caribbeans [140·8 per 100 000 persons/year (PPY)] and Black Africans (80·6 PPY) have markedly raised incidence rates compared with the White British group (20·2 PPY) for all psychosis. By diagnosis, rates are particularly raised for both schizophrenia and mania in African-Caribbeans and Black Africans. Both the White Other and Mixed groups have modestly increased rates for all diagnoses. The Asian group have a more modest increased rate for all psychosis (31·6 PPY), which holds true for schizophrenia and depressive psychosis. The rates for the 'Other' group are also raised, both for all psychosis (55·0 PPY) and for all diagnostic categories except 'other' psychosis.

When examined by gender, Table 1 demonstrates that these raised rates are present for both males and females. Male rates are generally higher than the corresponding female rates for schizophrenia and other psychosis.

Table 2 shows the IRR for each ethnic minority group, using the White British group as baseline. African-Caribbeans and Black Africans have markedly raised IRRs compared with the White British group. For all psychosis, African-Caribbeans have an IRR of 6·7 [95% confidence interval (CI) 5·4–8·3], and Black Africans, an IRR of 4·1 (3·2–5·3) after adjustment for age and sex. These adjusted IRRs are very similar to the crude IRRs (not shown). It is worth noting that African-Caribbeans have a significantly higher IRR than Black Africans. All other groups have more modestly increased IRRs, ranging from 1·6 (1·1–2·2) in the White Other group to 2·7 (1·8–4·2) in the Mixed group. Although Asians have an increased IRR of 1·5 (0·9–2·4), this was just beyond statistical significance.

Incidence rate ratios for schizophrenia and for mania in both African-Caribbeans and Black Africans are markedly elevated. Thus, the IRR for schizophrenia in African-Caribbeans is 9·1 (6·6–12·6) and for Black Africans is 5·8

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Table 2. *Combined and sex-specific age-adjusted incidence rate ratios (IRRs) with corresponding 95% confidence intervals in ethnic minority groups*

| | All psychosis (F20–33) | Narrow schizophrenia (F20) | Manic psychosis (F30–31) | Depressive psychosis (F32–33) | Other psychosis (F10–19; F21–29) |
|---|---|---|---|---|---|
| All | | | | | |
| African-Caribbean | 6·7 (5·4–8·3) | 9·1 (6·6–12·6) | 8·0 (4·3–14·8) | 3·1 (1·5–6·1) | 5·5 (3·8–8·0) |
| Black African | 4·1 (3·2–5·3) | 5·8 (3·9–8·4) | 6·2 (3·1–12·1) | 2·1 (0·9–5·0) | 2·7 (1·6–4·5) |
| Asian | 1·5 (0·9–2·4) | 1·4 (0·7–3·1) | 2·7 (0·9–7·6) | 3·0 (1·3–7·1) | 0·6 (0·2–1·9) |
| Other | 2·6 (1·7–3·9) | 3·5 (1·9–6·5) | 3·0 (0·9–10·0) | 5·6 (2·5–12·4) | 0·3 (0·1–2·2) |
| Mixed | 2·7 (1·8–4·2) | 2·6 (1·2–5·3) | 6·2 (2·6–15·0) | 4·0 (1·6–10·2) | 1·3 (0·5–3·5) |
| White Other | 1·6 (1·1–2·2) | 2·5 (1·6–3·9) | 1·7 (0·6–4·3) | 1·3 (0·5–3·2) | 0·8 (0·4–1·7) |
| Male | | | | | |
| African-Caribbean | 5·6 (4·2–7·5) | 7·9 (5·2–11·9) | 5·9 (2·1–16·3) | 2·3 (0·7–7·9) | 4·1 (2·4–7·0) |
| Black African | 4·0 (2·9–5·7) | 5·3 (3·3–8·5) | 7·6 (3·1–18·8) | 2·3 (0·7–7·8) | 2·5 (1·3–4·8) |
| Asian | 1·3 (0·7–2·4) | 0·9 (0·3–2·7) | 3·8 (1·1–13·1) | 4·3 (1·5–12·8) | 0·3 (0·1–2·1) |
| Other | 2·4 (1·3–4·1) | 3·5 (1·7–7·3) | No cases | 8·8 (3·3–23·6) | No Cases |
| Mixed | 2·7 (1·6–4·7) | 2·8 (1·2–6·4) | 8·6 (2·8–25·9) | 5·5 (1·6–18·8) | 0·5 (0·2–1·6) |
| White Other | 1·7 (1·1–2·5) | 2·5 (1·5–4·3) | 1·3 (0·3–5·8) | 2·8 (1·1–7·6) | 1·1 (0·6–2·0) |
| Female | | | | | |
| African-Caribbean | 8·1 (5·9–11·1) | 11·4 (6·8–19·3) | 9·3 (4·2–20·7) | 3·5 (1·5–8·1) | 7·9 (4·5–13·8) |
| Black African | 4·2 (2·8–6·4) | 6·8 (3·6–13·0) | 4·8 (1·7–13·4) | 2·0 (0·6–6·5) | 3·2 (1·4–7·4) |
| Asian | 1·9 (0·9–3·7) | 2·8 (0·9–7·9) | 1·4 (0·2–10·7) | 1·9 (0·4–8·0) | 1·3 (0·3–5·5) |
| Other | 2·9 (1·5–5·7) | 3·2 (0·9–10·4) | 6·6 (1·9–23·1) | 2·9 (0·7–12·3) | 1·0 (0·1–7·1) |
| Mixed | 2·7 (1·4–5·4) | 2·1 (0·5–8·7) | 4·0 (0·9–17·5) | 2·9 (0·7–12·3) | 2·8 (0·8–9·1) |
| White Other | 1·5 (0·8–2·5) | 2·4 (1·0–5·4) | 2·0 (0·6–7·1) | No Cases | 1·3 (0·5–3·8) |

Table 3. *Age-specific incidence rate ratios (IRRs) with corresponding 95% confidence intervals in ethnic minority groups for all psychosis*

| Age band (years) | African-Caribbean | Black African | Asian | Other | Mixed | White Other |
|---|---|---|---|---|---|---|
| 16–19 | 6·2 (3·6–10·9) | 2·8 (1·2–6·3) | 1·7 (0·6–4·7) | 2·3 (0·7–7·5) | 1·9 (0·7–5·4) | 1·2 (0·3–4·9) |
| 20–24 | 7·4 (4·6–11·8) | 3·7 (2·0–6·9) | 1·4 (0·6–3·5) | 1·4 (0·5–3·9) | 4·6 (2·3–8·9) | 0·9 (0·4–2·2) |
| 25–29 | 8·5 (5·1–14·1) | 7·1 (4·3–11·7) | 1·2 (0·4–4·0) | 2·6 (0·9–7·2) | 2·6 (0·9–7·3) | 1·5 (0·7–3·0) |
| 30–34 | 6·1 (3·6–10·4) | 4·1 (2·3–7·4) | 1·0 (0·3–4·1) | 5·3 (2·3–12·5) | 1·6 (0·4–6·4) | 2·1 (1·1–4·2) |
| 35–39 | 5·0 (2·7–9·4) | 3·4 (1·5–7·4) | 2·0 (0·5–8·3) | 6·0 (2·1–17·1) | 2·7 (0·6–11·2) | 1·9 (0·8–5·0) |
| 40–44 | 3·2 (1·3–7·9) | 3·2 (1·2–8·5) | 2·6 (0·6–11·3) | No cases | 2·5 (0·3–18·4) | 2·5 (0·9–7·4) |
| 45–49 | 6·1 (2·2–17·1) | No cases | 1·9 (0·3–14·3) | No cases | No cases | 2·1 (0·4–2·4) |
| 50–54 | 23·2 (7·7–69·4) | 10·3 (2·1–49·8) | No cases | 7·6 (0·9–61·6) | No cases | 4·4 (0·9–21·3) |
| 55–59 | 7·0 (1·9–25·9) | 4·3 (0·5–33·8) | No cases | No cases | No cases | 1·6 (0·2–12·5) |
| 60–64 | 7·3 (2·1–24·8) | No cases | 4·2 (0·5–34·3) | No cases | No cases | No cases |

(3·9–8·4). The IRR for mania in African-Caribbeans is 8·0 (4·3–14·8) and for Black Africans is 6·2 (3·1–12·1); these raised IRRs are present for both men and women. Rate ratios for the Asian, Other, Mixed and White Other groups are also elevated for both diagnoses, with for example, White Others having a 2·5-fold increased rate of schizophrenia compared with White British.

A somewhat different pattern is evident for depressive psychosis, with IRRs for all groups except the White Other group being raised to comparable degrees. Thus, African-Caribbeans have an IRR of 3·1 (1·5–6·1), Black Africans 2·1 (0·9–5·0), Asians 3·0 (1·3–7·1), Others 5·6 (2·5–12·4), and Mixed 4·0 (1·6–10·2).

Table 3 shows that the rate ratios observed for all psychosis in African-Caribbeans and Black Africans are raised across all age bands in this study and follow a similar pattern both for men and for women (data not shown).

There was no evidence of any interaction between study area and ethnicity for any of the diagnostic categories included in the study, implying that the differences in rates between groups did not differ significantly by study area.

## DISCUSSION

In this, the largest incidence study of psychosis in England and the first to utilise the 2001 Census data, we have confirmed the previously reported raised rates of schizophrenia in the African-Caribbean population. Our findings extend those of previous studies. We found robust evidence that these markedly raised rates exist in both men and women, in both African-Caribbeans and Black Africans, in all categories of psychosis, in all age groups and across three different areas in England contemporaneously. Furthermore, we were able to calculate rates for Asians, White Other and Mixed groups and to use White British (rather than All White) incidence rates as a baseline for calculating IRRs.

### Previous studies

In the UK, research in this area was hampered prior to the 1991 Census because denominator data was not collected at the individual level but only on the head of household. Research using 1991 data (King *et al*. 1994; van Os *et al*. 1996; Bhugra *et al*. 1997; Harrison *et al*. 1997) indicated a high incidence of schizophrenia in ethnic minority groups. However, until recently, it was unclear whether these raised rates were specific to schizophrenia or whether they extended to all psychotic disorders, though several studies (Leff *et al*. 1976; Bebbington *et al*. 1981; Hunt *et al*. 1993) had suggested rates of mania were also raised. However, in a recent paper from our group reporting rates of mania in our three study areas, we reported incidence rates of mania in ethnic minority groups, particularly African-Caribbeans and Black Africans, were significantly raised when compared with an all-White group (Lloyd *et al*. 2005). It remained uncertain whether these increased rates extended to all psychotic disorders and to all ethnic minority groups in the UK. Some studies have suggested increased rates of schizophrenia in Africans (van Os *et al*. 1996), but findings for Asians have been contradictory (King *et al*. 1994; van Os *et al*. 1996; Bhugra *et al*. 1997; Harrison *et al*. 1997). The EMPIRIC study (King *et al*. 2005), a community-based prevalence study, found a more modest association between ethnicity and the likelihood of reporting psychotic symptoms. African-Caribbeans were only about twice as likely to report such symptoms compared with Whites. However, it should be noted that findings from prevalence studies, which measure the number of prevalent cases in a population at any given time, differs from incidence, and that one should not make direct comparisons between these two measures.

Studies from continental Europe report that the rate of schizophrenia for migrants to other countries is also raised. Two studies of migrants to The Netherlands from Surinam, the Dutch Antilles and Morocco (Selten *et al*. 1997, 2001), and one study of immigrants to Sweden from East Africa (Zolkowska *et al*. 2001) indicate a higher incidence of schizophrenia and other psychotic illnesses in these groups. The population in Surinam and the Surinamese community in The Netherlands are ethnically diverse, with around 40% each from Asian and African backgrounds.

The incidence of schizophrenia in the Caribbean does not appear to be markedly raised. Three major incidence studies have been conducted, covering Jamaica (Hickling *et al*. 1995), Trinidad (Bhugra *et al*. 1996) and Barbados (Mahy *et al*. 1999), the three islands from where the majority of UK migrants originated. The incidence of schizophrenia in each study was comparable to the rate for the UK White population, and significantly lower than the comparable rate for the UK African-Caribbean population.

The raised rates of psychosis in African-Caribbeans do not appear to be due to misdiagnosis (Lewis *et al*. 1990; Hickling *et al*. 1999) or disproportionate referral to services (Wessely *et al*. 1991; Mortensen *et al*. 1997). These factors, together with our confirmation of findings in previous studies (particularly those using 1991 Census data and employing strict operational diagnostic criteria) suggest that these raised rates cannot be merely explained by methodological artefact.

### Interpretation of current findings

We observed only modestly raised rates for our Asian group, with the relatively small numbers of cases involved reducing our ability to detect a true difference unequivocally. Two previous studies have examined these populations. Bhugra and colleagues (1997) found no overall increase in the incidence of schizophrenia in the

Asian population in Ealing, but noted elevated rates in those over 30 years old. King and co-workers (1994) found elevated rates in the Asian population in their North London study. What can be stated with some confidence is that the rates for schizophrenia and mania in Asians do not appear to be raised to the same extent as for African-Caribbeans and Black Africans. Understanding this difference between these groups, who migrated to the UK during the same era, and who appear to experience similar levels of racial discrimination, may reveal important factors which play a part in the markedly raised rates of psychosis in the Black British populations. Brugha and colleagues (2004), in their survey of householders in Britain found that African-Caribbeans and Black Africans were more likely than other ethnic minority groups to suffer from indicators of social disadvantage, such as: unemployment; lone parent status; lower social class; low perceived social support; poverty (indicated by lack of car ownership) and having a primary social support group of fewer than three close others. Further, they found that adjusting for these factors modestly attenuated the risk of psychosis in these groups.

The rates of psychosis among the 'Other' group were also raised. This group consisted of members of other smaller minority groups and was composed of people mainly from the Middle East, North Africa, China, Vietnam and Japan. Although this is a rather disparate group, these findings add weight to the concept that all migrant groups are at some degree of increased risk of psychotic illness. A recent meta-analysis of population-based incidence studies of schizophrenia in migrant populations (Cantor-Graae & Selten, 2005) demonstrated ethnic minorities had, overall, an increased relative risk of 2·9 compared with the indigenous populations. This effect was more marked in migrants from either developing countries or from countries where the majority population is Black. A systematic review by McGrath and colleagues (2004) found a similar effect for schizophrenia in migrant populations, with an overall median rate ratio of 4·6. Furthermore, our White Other group (comprised mainly of White Irish and White Europeans) had over a twofold increased IRR for schizophrenia. Many of these groups have migrated more recently than their African-Caribbean and Asian counterparts, which suggests that the rates in these groups may represent the degree of increased risk conferred by relatively recent migration. Further studies are required to specifically test this hypothesis. This study also provides the first evidence of raised rates of psychosis in people of mixed race.

Although we have previously reported IRRs for mania (Lloyd *et al*. 2005), the present analysis used the White British group, rather than an all-White group as a baseline. Thus, the IRRs for manic psychosis reported here are more elevated than in our previous report, but follow a remarkably similar pattern to those of schizophrenia. These findings are included in this paper in order to provide a comprehensive picture of the rates of all psychotic disorders, and to allow direct comparison of IRRs for each diagnosis in each ethnic minority group.

The finding of raised IRRs for depressive psychosis is, to our knowledge, the first such report from the UK. The pattern of these raised rates differed from that for both schizophrenia and mania in that rates were more homogeneously raised for all minority groups. There is little literature on rates of this disorder among ethnic minority groups. The closest comparable study is that of Selten and colleagues (2003), who examined the admission rates for both first-episode bipolar disorder of manic and depressed types in migrant groups in The Netherlands, and found only small increases in the admission rates for manic illness in Surinamese, but not Turkish migrants. However, they found more substantial increases in admission rates for both Surinamese and Turkish migrants for bipolar disorder depressed type, particularly for men. These findings are in partial agreement with the findings for depressive psychosis reported here, in that both groups had modestly raised rate ratios.

There does not appear to be a major effect of generation, with raised rates of schizophrenia-like psychosis being found in the elderly first generation in London (Reeves *et al*. 2001). Our study provides further evidence of a lack of an age or 'generational' effect, with IRRs raised for all psychoses across all age groups.

We found no evidence of an interaction between study area and ethnicity for any psychotic disorders examined in our study. While this may

suggest that factors related to urbanicity are not associated with the findings of increased rates of psychotic disorder in ethnic minority groups (a fact in part supported by the consistent findings of increased rates of psychosis among African-Caribbeans in several English areas over the last few decades), it is worth bearing in mind that this is a somewhat crude method of investigating the role of urban factors in these groups. For example, although the Nottingham area is overall less densely urban that the Southeast London area, this does not take into account variation in urbanicity within our centres; our Nottingham centre ranges from highly urban to rural. Thus, in order to definitively explore the role of urban factors, it may prove necessary to do such analyses at a smaller, more tightly defined geographical scale.

## Methodological considerations

Our study has a number of strengths. We employed a prospective case ascertainment design in three well-defined geographical areas; we used operational consensus diagnoses performed blind to ethnic group status; we used White British (rather than all-White groups) as our baseline group; and we performed leakage studies in Southeast London and Nottingham to minimize the chance of under-ascertainment.

We collapsed the 16 ethnic group categories of the 2001 Census into seven categories for this study. We chose this option for clarity of presentation and also to maximize our available power. However, this seven-item classification still represents a more fine-grain categorization than previous studies in this field. When examined individually, each ethnic minority subgroup within our seven groups had comparably raised rates. For example, Indians, Pakistanis and Bangladeshis had similar rates and rate ratios, an interesting finding given the differing cultures and traditions across these ethnic groups. Similarly, the Black Caribbean and Black Other groups were merged, as they had similar rates. We acknowledge, however, that while the majority of those who ascribe themselves as Black Other are of African-Caribbean origin, a minority will be of Black African, or even African-American origin. We also acknowledge that, despite the consistency of our findings for each ethnic group in all centres, these groupings remain crude and do not reflect the fact that we are examining different groups in different contexts. Further work at a more detailed level is required to elucidate the underlying causes of the different rates found in different ethnic groups.

Although the Bristol centre recruited over a shorter time period than Southeast London or Nottingham and a formal leakage study was not undertaken in this centre, the overall rates of psychosis in Bristol were remarkably comparable to those of Nottingham, suggesting that there is unlikely to have been a significant error in our estimates for this centre. Furthermore, analysis of the data excluding Bristol cases did not alter our findings.

The majority of cases in this study were interviewed directly, and the remainder had their ethnicity classified using their and their parents' places of birth, rather than by self-ascription. Although this might lead to misclassification of a small proportion of cases, the likelihood of this happening was minimized by fact that we collapsed our ethnic group classification into seven broad categories.

Case ascertainment was achieved by service contact. Selection biases may have been present if psychotic patients from ethnic minority groups were more likely to contact services than their White counterparts, thus contributing to the increased incidence of psychoses based on first contact of service. However, since a five- to tenfold difference in incidence was observed in African-Caribbeans and Black Africans, it is highly unlikely that psychotic disorders of comparable severity would remain undetected in the White population on a scale large enough to account for such incidence rate ratios. Population studies have also failed to support the notion that a large number of psychotic individuals remain undetected by the services (Harrison, 1990). However, it should be noted that we cannot exclude the possibility that incidence rates calculated on the basis of first presentation to services may not correspond exactly to the true incidence of psychosis in any community at any given time.

A well recognized limitation of the 1991 UK Census was underenumeration of certain ethnic minority groups. By using data obtained from the 2001 Census, which was closer in time to the AESOP survey period than its 1991 predecessor, and which accounted for underenumeration of

certain groups (particularly the young and certain ethnic minorities) through its one-number methodology (Pereira, 2002), we believe that we have used the most accurate denominator estimates available. Furthermore, analysis of our data using the 1991 Census data (corrected for underenumeration) does not alter our main findings (data not shown).

Although our study is the largest first-presentation study in the UK to date, with an effective denominator of over 1·6 million person-years, our power to detect significant differences in smaller groups was still limited. Thus, the Asian group, despite having rate ratios consistently above 1·0 often had confidence intervals that did not exclude the possibility of our findings being due to chance. We feel that our findings, taken as a whole, provide evidence of a modest increase in rates in this group which requires exploration in future studies.

Thus, although some methodological issues are present in our study, we believe their combined effect is insufficient to severely undermine the impact of our primary findings.

## CONCLUSION

We have demonstrated remarkably high incidence rates of schizophrenia and mania in both African-Caribbeans and Black Africans, in men and women, in three urban UK settings. Rates in other ethnic minority groups are more modestly increased. We have shown, for the first time, that people of mixed race have an elevated risk of psychosis and that non-British Whites have an elevated risk of schizophrenia. We have also demonstrated increased rates for depressive psychosis, and that all minority populations show a similar degree of increase for this diagnosis. Raised rates of psychosis were found in all age groups in our study.

If we can explain these findings, we stand to learn much about schizophrenia and other psychoses, as well as providing improved psychiatric services for these particular population groups.

## APPENDIX. The AESOP Study Group

*Bristol*: Glynn Harrison, Florence Muga, John Holloway. *Cambridge*: Peter B. Jones, Wai Lun Alan Fung, Jouko Mietunen, Maureen Ashby, Hazel Hayhurst. *London*: Robin M. Murray, Julian Leff, Tom Craig, Rosemarie Mallett, Paul Fearon, Craig Morgan, Kevin Morgan, Paola Dazzan, James MacCabe, Chiara Samele, Edwin Gwenzi, Mandy Sharpley, Simon Vearnals, Gerard Hutchinson, Rachel Burnett, Jane Kelly, Kenneth Orr, Jeza Salvo, Kathy Greenwood, David Raune, Maria Lambri, Samantha Jones, Stefan Auer, Per Rohebak, Laura McIntosh. *Nottingham*: Gillian Doody, Jane Tarrant, Sue Window, Pat Williams, Tuhina Lloyd, Hemant Bagalkote, Becci Dow, Daphne Boot, Annette Farrant, Steve Jones, Jayne Simpson, Ramona Moanette, Philp Z. Sirip Suranim, Mark Ruddell, John Brewin, Ian Medley.

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## DECLARATION OF INTEREST

None.

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