Raised Incidence Rates of All Psychoses Among Migrant Groups

Findings From the East London First Episode Psychosis Study

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Context: Certain black and minority ethnic groups are at increased risk for psychoses. It is unknown whether risk for second- and later-generation black and minority ethnic groups in the United Kingdom is universally increased or varies by ethnicity, population structure, or diagnostic category.

Objectives: To examine whether excess risk in black and minority ethnic groups varies by generation status and to determine whether this is explained solely by an excess of broadly defined schizophrenia.

Design: Population-based epidemiological survey of first-onset psychoses during a 2-year study period.

Setting: Three inner-city boroughs in East London, England.

Patients: Four hundred eighty-four patients with first-episode psychosis aged 18 to 64 years.

Main Outcome Measures: Nonaffective or affective psychoses according to the *DSM-IV*.

Results: Raised incidence of both nonaffective and affective psychoses were found for all of the black and mi-

nority ethnic subgroups compared with white British individuals. The risk of nonaffective psychoses for first and second generations varied by ethnicity (likelihood ratio test, *P*=.06). Only black Caribbean second-generation individuals were at significantly greater risk compared with their first-generation counterparts (incidence rate ratio, 1.6; 95% confidence interval, 1.1-2.4). No significant differences between first and second generations were observed in other ethnic groups. Asian women but not men of both generations were at increased risk for psychoses compared with white British individuals. Patterns were broadly upheld for the affective psychoses.

Conclusions: Both first- and second-generation immigrants were at elevated risk for both nonaffective and affective psychoses, but this varied by ethnicity. Our results suggest that given the same age structure, the risk of psychoses in first and second generations of the same ethnicity will be roughly equal. We suggest that socioenvironmental factors operate differentially by ethnicity but not generation status, even if the exact specification of these stressors differs across generations. Research should focus on differential rates of psychoses by ethnicity rather than between generations.

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A CENTRAL TENET OF THE EPIdemiology of schizophrenia has been that the narrowly defined disorder occurs with equal incidence worldwide, emphasizing an apparent genetic etiology. However, higher risks of psychosis among migrant groups have been observed since 1932 when Norwegian migrants to the United States were shown to be at increased risk.[1] Considerable heterogeneity in the incidence of psychoses has now been observed,[2,3] including among migrants, who appear to be at elevated risk for psychoses compared with native populations.[4] Immigration is an important life event and difficulties in assimilation may remain chronic as concep-

tualized within the stress-vulnerability model of risk for psychosis, although individual risk is still considered to be mediated through genetic susceptibility.[5] High rates of schizophrenia and other psychoses among persons of black Caribbean origin in the United Kingdom[6-8] in contrast to those living in the Caribbean[9-11] have emphasized societal level effects such as discrimination or greater levels of social adversity. Further, it appears that the increased risk of psychosis remains or may even be higher for second-generation black Caribbean groups born in the United Kingdom.[8] Similar findings have not been consistently demonstrated for other ethnic groups, including persons originating from the Indian subcontinent—the largest im-

migrant group to the United Kingdom and who might be expected to have experienced migration-related societal pressures similar to those experienced by the black Caribbean and black African groups.

A major limitation in this area has been that many studies have not separated the effects of migration and ethnicity by examining whether rates of psychoses differ between first-generation immigrants born outside the United Kingdom and individuals born in the United Kingdom to first-generation immigrants (second and subsequent generations). Further, to our knowledge no study to date has considered whether these effects are sex specific.

The East London First Episode Psychosis study was designed to answer the following questions: (1) whether the incidences of psychoses differ across migrant groups when compared with the host population; (2) whether the effect of migration is ameliorated in subsequent generations by UK birth; (3) whether the effects differ between migrant groups according to sex; and (4) whether the effects of migration differ according to diagnostic category of psychosis.

METHODS

STUDY DESIGN AND POPULATION

The East London First Episode Psychosis study is a large, population-based incidence study conducted during 2 years in 3 neighboring London boroughs of East London, England: City and Hackney, Newham, and Tower Hamlets. The area is exclusively inner-city urban, characterized by high levels of socioeconomic deprivation. Historically, it has hosted a number of diverse ethnic groups who immigrated to the United Kingdom. Ethical approval was obtained from the local research ethics committee in East London.

The population at risk was estimated in our 3 boroughs using the 2001 census of Great Britain, including all people aged 18 to 64 years at the time of the census (April 1, 2001). Denominator data were stratified by age, sex, ethnicity, and country of birth (henceforth first generation [non-UK born] or second generation and later [UK born]). The denominator data were multiplied by 2 to estimate the person-years at risk during the 2-year period of our study.

PROCEDURES

We identified everyone aged 18 to 64 years living in our study area who made contact with mental health services because of a first episode of any probable psychotic disorder. The study took place during 24 months: from December 1, 1996, to November 30, 1998, in City and Hackney and from December 1, 1998, to November 30, 2000, in Newham and Tower Hamlets.

All potential cases presenting to psychiatric services for the first time (including adult community mental health teams, inpatient units, forensic services, learning disability services, adolescent mental health services, and drug and alcohol units) were screened. Health service bases were contacted weekly to identify all potential candidates. The initial inclusion criteria were based on those used in the World Health Organization study and the Ætiology and Ethnicity in Schizophrenia and Other Psychoses study.[2,12]

Patients in their first stages of illness meeting these criteria were identified and went on to subsequent stages of the protocol. To minimize leakage, methods used by Cooper et al[13] were conducted during the study period to identify patients missed by the screening process, including checking with psychiatrists involved in private practice, private psychiatric hospitals served by the study area, and high-security hospitals, reviewing new service registration forms in the medical records department, and examining computerized information systems. All patients who had been given a diagnosis of any psychotic syndrome were identified and the cases were reviewed. Clinical staff were contacted when there was uncertainty regarding cases.

Patients who passed the screen underwent a battery of assessments including the Schedules for Clinical Assessment in Neuropsychiatry,[14] the Personal and Psychiatric History Schedule, and a schedule developed to record sociodemographic data. For all patients who declined an interview, the Schedules for Clinical Assessment in Neuropsychiatry Item Group Checklist was completed based on case notes and information from clinical staff. Researchers were trained in the Schedules for Clinical Assessment in Neuropsychiatry interview on a World Health Organization–approved course and established prestudy reliability using independent rating of videotaped interviews. Diagnoses were allocated by consensus agreement between the principal investigator (J.W.C.) and the clinical researcher who conducted the individual assessments. The researcher presented the clinical information to the principal investigator, who remained blind to the ethnicity of the patient. Diagnoses were made using this and all other information from the case notes, item ratings in the Schedules for Clinical Assessment in Neuropsychiatry, and collateral histories according to the *DSM-IV*.[15] We investigated 2 broad outcomes: nonaffective psychoses (including schizophrenia, schizophreniform disorder, and schizoaffective disorder) (*DSM-IV* codes 295.xx, 297.xx, 298.8, and 298.9) and affective psychoses (*DSM-IV* codes 296.x4, 296.80, and 296.90), including affective psychoses not otherwise specified.

Ethnicity was ascribed by a multiethnic panel of researchers using all available information, including self-ascription, place of birth, and parental place of birth, the final decision being that of the researcher. We coded ethnicity according to the same 16 categories used in the 2001 census. For analytical purposes, we collapsed both our numerator and denominator data to produce 6 ethnic subgroups: white British, white other (predominantly Irish and European), black Caribbean (including black other, mixed white, and black Caribbean groups), black African, Asian (Indian, Pakistani, and Bangladeshi groups), and all other ethnic groups (Chinese, other Asian, and other mixed ethnic groups).

STATISTICAL ANALYSES

Descriptive epidemiological data are reported separately for the white British group and each of the 5 black and minority ethnic (BME) subgroups.[16] Both crude and age- and sex-adjusted incidence rates were calculated with their 95% confidence intervals (CIs) for each ethnic group. Rates are presented per 100 000 person-years unless otherwise stated. Analyses were conducted using Stata version 9 statistical software (Stata Corp, College Station, Texas).

Direct standardization was used to obtain incidence rates for different ethnic groups adjusted for age and sex. Rates in each ethnic group were standardized using the 2001 census population of England and Wales stratified by sex and age (ages 18-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64 years). Poisson regression was conducted to examine potential differences in the incidence of psychoses between different ethnic groups controlled for age and sex. We tested whether incidence rates differed significantly between ethnic groups according to generation status by fitting an a priori interaction term between ethnicity and generation status. Sig-

Table 1. Basic Demographic Characteristics of Numerator and Denominator Populations in the East London First Episode Psychosis Study

	No. (%)			
Denominator Population	Cases (n=484)	Population at Risk[a] (n=828 546)	χ^2 Test (df)	P Value
Sex				
Male	298 (61.6)	406 064 (49.0)	30.5 (1)	<.001
Female	186 (38.4)	422 482 (51.0)		
Age group, y				
18-24	143 (29.6)	150 806 (18.2)	97.4 (4)	<.001
25-34	207 (42.8)	272 236 (32.9)		
35-44	78 (16.1)	196 774 (23.7)		
45-54	39 (8.1)	122 880 (14.8)		
55-64	17 (3.5)	85 854 (10.4)		
Ethnicity				
White British	112 (23.1)	345 080 (41.6)	131.2 (5)	<.001
White other	66 (13.6)	97 420 (11.8)		
Black Caribbean	90 (18.6)	70 978 (8.6)		
Black African	83 (17.2)	77 422 (9.3)		
Asian	106 (21.9)	178 366 (21.5)		
Other	27 (5.6)	59 280 (7.2)		
Country of birth				
First generation, non-UK born	240 (49.6)	375 054 (44.4)	5.3 (1)	.02
Second generation, UK born	244 (50.4)	469 970 (55.6)		
DSM-IV diagnosis				
Schizophrenia	268 (55.4)	NA		
Other nonaffective psychoses	94 (19.4)	NA		
Affective psychoses	122 (25.2)	NA		

Abbreviation: NA, not applicable.
[a] Population data estimated from census and multiplied by length of study period, 2 years in each district.

nificance was assessed via both Wald and likelihood ratio tests. The UK-born white British group was used as the baseline for reported incidence rate ratios (IRRs).

RESULTS

DESCRIPTIVE EPIDEMIOLOGY

A total of 484 cases met the inclusion criteria. The overall age- and sex-standardized incidence of psychoses in the study was 50.2 per 100 000 person-years (95% CI, 45.5-54.9). The total number of person-years in East London adjusted for the 2-year study period was 414 273: 201 974 men (48.8%) and 212 299 women (51.2%). Patients were more likely to be men, younger, from a BME subgroup, and non-UK born compared with the population at risk in East London (**Table 1**). A detailed inspection of the demographic profile of each ethnic group revealed considerable differences in the population at risk (**Figure**). The white British group was overwhelmingly and unsurprisingly composed of people born in the United Kingdom (95.5%). In contrast, only 42.8% of the black Caribbean population at risk were born in the UK, although this was the largest proportion of second- or later-generation immigrants in any BME group. Second-generation black Caribbean immigrants were predominantly younger than 44 years. By comparison, first-generation black Caribbean groups were largely older than 35 years, consistent with the main period of immigration from the Caribbean in the 1950s and 1960s. For all other ethnic groups, most of the population at risk were

of first-generation status rather than later-generation status. These first-generation immigrants were notably younger than those in the black Caribbean group, reflecting more recent migration histories.

NONAFFECTIVE PSYCHOSES

A total of 362 cases received a diagnosis of nonaffective psychosis (**Table 2**). The overall age- and sex-standardized incidence was high (36.8 per 100 000 person-years; 95% CI, 32.8-40.7). After adjustment for age and sex, IRRs were elevated for all ethnic groups (with the exception of the "other" group) compared with the white British group. The magnitude of this risk was highest for the black Caribbean (IRR, 4.2; 95% CI, 3.0-5.8) and black African (IRR, 3.4; 95% CI, 2.4-4.7) groups, but rates were also significantly elevated by around 70% and 80% in Asian and white other ethnic groups, respectively.

We observed some evidence that the incidence of nonaffective psychoses in ethnic minority groups varied by generation status (likelihood ratio test, P=.06). Second-generation black Caribbean immigrants were at greater risk for nonaffective psychoses than their first-generation counterparts (IRR, 1.6; 95% CI, 1.1-2.4; P=.02) after adjustment for age and sex, although rates were significantly elevated in both generations compared with the UK-born white British group. This pattern differed for the black African group, where the magnitude of risk was similarly elevated in both first-generation (IRR, 3.2; 95% CI, 2.3-4.6) and second-generation (IRR, 3.7; 95% CI, 2.2-6.4) groups. Both first- and second-generation white
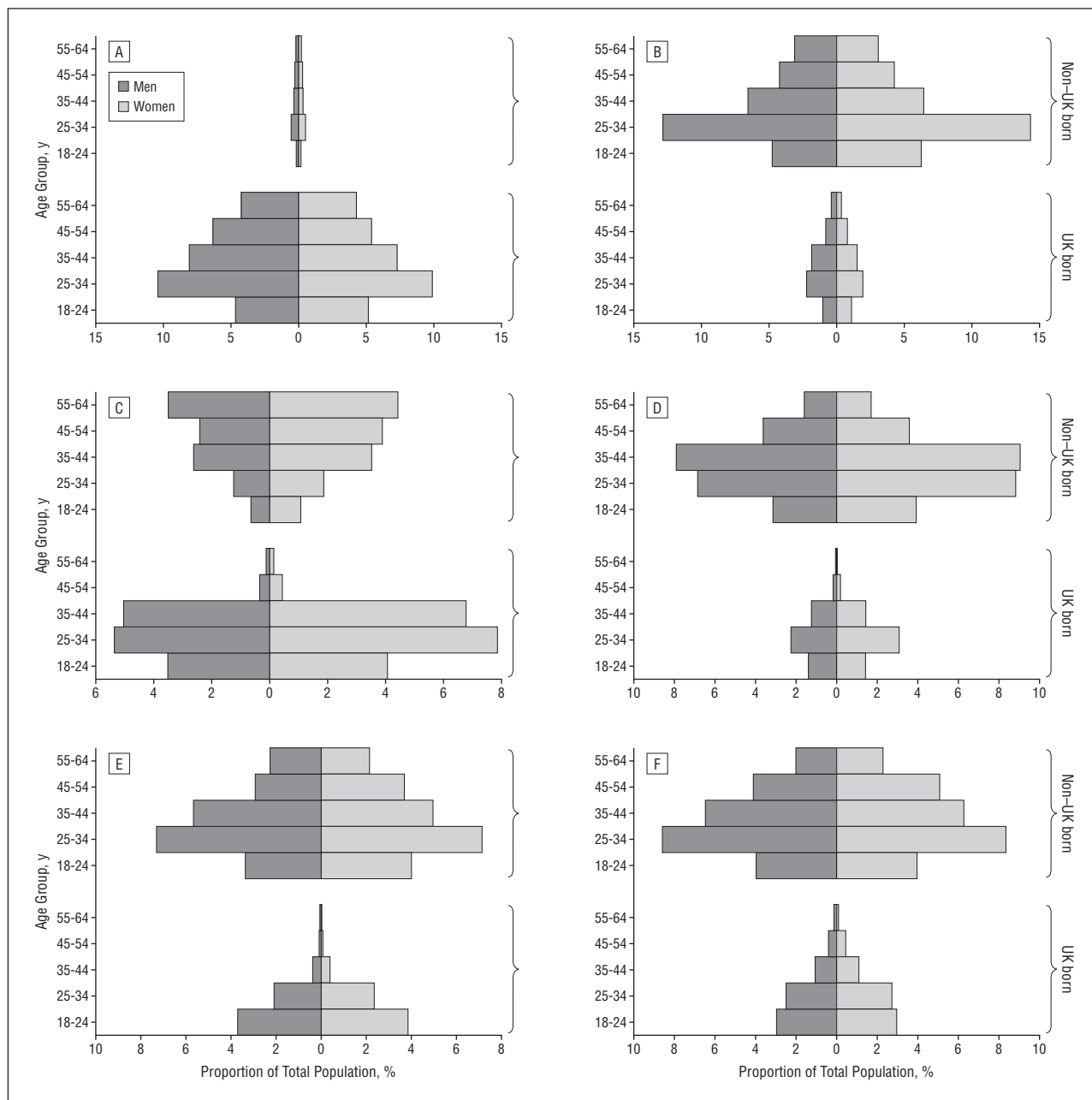
Figure. Population pyramids for population at risk in East London, England, by generation status for white British (A), white other (B), black Caribbean (C), black African (D), Asian (E), and other (F) ethnicities.

other immigrants had increased rates of nonaffective psychoses. First- but not second-generation Asian immigrants were at significantly elevated risk compared with the UK-born white British group, although there was no evidence that the incidence rate of nonaffective psychoses differed between generations (Wald $P=.14$).

Stratification by sex revealed broadly similar patterns as described earlier for women (data available from us), with the exception that both first-generation (IRR, 3.6; 95% CI, 2.1-6.4) and second-generation (IRR, 2.3; 95% CI, 1.0-5.3) Asian women appeared to have a significantly elevated risk of nonaffective psychoses compared with their UK-born white British counterparts. Neither first-generation (IRR, 1.3; 95% CI, 0.8-1.9) nor second-generation (IRR, 1.0; 95% CI, 0.5-1.8) Asian men

were at elevated risk for nonaffective psychoses. Black Caribbean, black African, and white other second-generation men were at significantly elevated risk for psychoses compared with their white British counterparts after adjustment for age (data available from us). For first-generation men, only the black African group was at elevated risk for nonaffective psychoses (IRR, 3.1; 95% CI, 2.0-4.7).

AFFECTIVE PSYCHOSES

A total of 122 cases met the inclusion criteria for affective psychosis. The overall age- and sex-standardized incidence of affective psychosis in the study was 13.5 per 100 000 person-years (95% CI, 10.9-16.0). As for the non-

Table 2. Incidence of *DSM-IV* Nonaffective Psychoses by 6-Category Ethnicity Variable[a]

Stratum	Total Sample			Non-UK Born[b]		UK Born[c]		Wald *P* Value for Significant Difference Between UK Born and Non-UK Born IRR
	Cases, No. (%)	Adjusted Rate (95% CI)[d]	IRR (95% CI)[e]	Cases, No. (%)	IRR (95% CI)[e]	Cases, No. (%)	IRR (95% CI)[e]	
Total	362 (100.0)	36.8 (32.8-40.7)	NA	175 (48.3)	NA	187 (51.7)	NA	NA
Ethnicity								
White British	82 (22.7)	20.9 (16.2-25.6)	1 [Reference]	2 (1.1)	0.5 (0.1-2.2)	80 (42.8)	1 [Reference]	.39
White other	46 (12.7)	42.4 (28.6-56.2)	1.8 (1.3-2.6)	35 (20.0)	1.6 (1.1-2.4)	11 (5.9)	2.8 (1.5-5.2)	.11
Black Caribbean	66 (18.2)	90.8 (67.8-113.8)	4.2 (3.0-5.8)	11 (6.3)	2.3 (1.2-4.3)	55 (29.4)	4.9 (3.5-6.9)	.02
Black African	64 (17.7)	73.6 (54.4-92.7)	3.4 (2.4-4.7)	48 (27.4)	3.2 (2.3-4.6)	16 (8.6)	3.7 (2.2-6.4)	.63
Asian	84 (23.2)	37.7 (28.1-47.2)	1.7 (1.2-2.3)	64 (36.6)	1.8 (1.3-2.6)	20 (10.7)	1.3 (0.8-2.1)	.14
Other	20 (5.5)	25.1 (13.7-36.4)	1.3 (0.8-2.1)	15 (8.6)	1.3 (0.7-2.3)	5 (2.7)	1.1 (0.5-2.8)	.79

Abbreviations: CI, confidence interval; IRR, incidence rate ratio; NA, not applicable.
[a] For interaction between ethnicity and country of birth, *P*=.06.
[b] Indicates first generation.
[c] Includes second- and third-generation UK-born groups.
[d] Direct standardization for age and sex using the population structure of England and Wales as recorded by the 2001 census of Great Britain.
[e] Adjusted for age and sex.

affective psychoses, after adjustment for age and sex, IRRs were significantly elevated in the black Caribbean, black African, and white other populations compared with the white British group (**Table 3**). The incidence of affective psychoses did not appear to be increased in the Asian population (IRR, 1.3; 95% CI, 0.8-2.3).

There was no evidence that the incidence of affective psychoses by ethnic group varied according to generation status (likelihood ratio test, *P*=.24). Nevertheless, because the patterns for the affective psychoses echoed those of the nonaffective psychoses, although with less precision, we have presented results stratified by generation status. As for nonaffective psychoses, the magnitude of the point estimate of risk was higher in second-generation rather than first-generation black Caribbean groups. Rates were comparably elevated for both first- and second-generation immigrants in the black African and white other groups despite the wide precision in estimates. There was weak evidence that first-generation but not second-generation Asian subgroups were at elevated risk for psychoses compared with the UK-born white British group (Wald *P*=.08). The patterns described earlier broadly held when we inspected the results for men and women separately, but estimates were imprecise (data available from us).

COMMENT

PRINCIPAL FINDINGS

Incidence rates of psychotic illness were raised for all minority groups compared with the white British population in this socioeconomically deprived area of inner London. Overall, our rates are among the highest ever recorded and compare closely with those found in inner South London in a study carried out using the same methods during the same period.[2]

Our findings suggest that the risk of psychoses according to generation status varies between ethnic groups, most likely as a result of the composition of the underlying population at risk. The black Caribbean group provides an illustration of this: first- and second-

generation immigrants were both at significantly greater risk for nonaffective psychoses than the white British group, but the magnitude of this risk was significantly greater in the second generation; this is principally because first-generation black Caribbean immigrants have now largely passed through the main period of risk of psychoses. For other ethnic groups such as the black African and white other groups where the modal age group in each generation was closer to the main period of risk of psychoses, the elevated risk of psychoses was comparable between first- and second-generation immigrants. It is interesting to note that we observed a significantly elevated risk of nonaffective psychoses in second-generation black African and white other immigrants despite their relatively small population at risk. In contrast, only first- rather than second-generation Asian immigrants appeared to be at elevated risk for nonaffective psychoses. However, when we inspected the results in more detail, we observed differences in risk in the Asian group by sex. Both first- and second-generation Asian women but not men had higher incidence rates of nonaffective psychoses. The patterns were broadly echoed for the affective psychoses, although the smaller sample size led to imprecision around point estimates of risk.

METHODOLOGICAL CONSIDERATIONS

The study is among the largest from a single center to ascertain first-episode cases of psychoses using a robust method and standardized diagnoses, providing accurate estimates of incidence for several ethnic groups in an inner-city area. Furthermore, our highly heterogeneous population with respect to ethnicity, including a large proportion of people originating from the Indian subcontinent, allowed us to test for differences in rates between several ethnic groups. This was not possible in other comparable studies, which were often underpowered to detect such differences. We were able to obtain precise estimates of incidence in both first- and second-generation groups for several BME groups, although it should be noted that the small number of cases in some BME groups may have limited our ability to detect differences in incidence between genera-

Table 3. Incidence of *DSM-IV* Affective Psychoses by 6-Category Ethnicity Variable[a]

Stratum	Total Sample			Non-UK born[b]		UK Born[c]		Wald *P* Value for Significant Difference Between UK Born and Non-UK Born IRR
	Cases, No. (%)	Adjusted Rate (95% CI)[d]	IRR (95% CI)[e]	Cases, No. (%)	IRR (95% CI)[e]	Cases, No. (%)	IRR (95% CI)[e]	
Total	122 (100.0)	13.5 (10.9-16.0)	NA	65 (53.3)	NA	57 (46.7)	NA	NA
Ethnicity								
White British	30 (24.6)	8.6 (5.4-11.8)	1 [Reference]	0	NA	30 (52.6)	1 [Reference]	NA
White other	20 (16.4)	17.7 (9.1-26.4)	2.3 (1.3-4.0)	17 (26.2)	2.2 (1.2-3.9)	3 (5.3)	2.1 (0.6-6.8)	.95
Black Caribbean	24 (19.7)	33.2 (18.5-47.9)	4.0 (2.4-6.9)	7 (10.8)	3.2 (1.4-7.4)	17 (29.8)	4.2 (2.3-7.7)	.55
Black African	19 (15.6)	19.1 (10.5-27.8)	2.7 (1.5-4.9)	15 (23.1)	2.6 (1.4-4.8)	4 (7.0)	2.7 (1.0-7.7)	.93
Asian	22 (18.0)	14.0 (7.0-21.0)	1.3 (0.8-2.3)	20 (30.8)	1.6 (0.9-2.8)	2 (3.5)	0.4 (0.1-1.8)	.08
Other	7 (5.7)	10.8 (1.3-20.3)	1.3 (0.6-2.9)	6 (9.2)	1.4 (0.6-3.3)	1 (1.8)	0.7 (0.1-5.2)	.53

Abbreviations: CI, confidence interval; IRR, incidence rate ratio; NA, not applicable.
[a] For interaction between ethnicity and country of birth, *P*=.24.
[b] Indicates first generation.
[c] Includes second- and third-generation UK-born groups.
[d] Direct standardization for age and sex using the population structure of England and Wales as recorded by the 2001 census of Great Britain.
[e] Adjusted for age and sex.

tions if they truly existed. Nevertheless, we believe our findings provide good evidence that rates are not elevated to a greater extent in second- than first-generation immigrants except where dramatic differences in the underlying age structures of the populations at risk are evident. Larger studies will of course be needed to confirm this novel finding.

The geographical area of East London contains the highest concentration of socioeconomically deprived wards in England and Wales and has an unusual population for the United Kingdom, with many white British persons experiencing a level of socioeconomic deprivation similar to that of migrant groups. We have independently examined the effects of socioeconomic status on increased rates of psychosis among different ethnic subgroups in East London and demonstrated that these are unlikely to be confounded by individual-level social class.[17]

We have replicated the high rates observed recently in another part of inner-city London and, like that study, confirmed considerable heterogeneity by ethnicity,[18] a finding observed elsewhere in Europe.[19] Like previous studies, we have observed particularly high rates of psychoses in the black Caribbean and black African groups and sex differences in the Asian group for nonaffective psychoses. We also found a significant excess of other nonaffective psychoses (ie, acute psychoses) in first- and second-generation black Caribbean immigrants as well as second-generation black African and white other groups, which we believe to be novel (data available from us). Our study did not replicate the increased rates of affective psychoses in Asian men found in the Ætiology and Ethnicity in Schizophrenia and Other Psychoses study,[18] but given the small number of subjects in these subsamples, we cannot exclude chance as an explanation of this discrepancy. Taken together, these 2 studies using similar methods have surveyed more than 40% of London's inner-city boroughs. Our findings should be of utility to health care planning in London and potentially in other highly urbanized settings.

The study used the 2001 census to estimate the denominator population, which avoided the underenumeration of minority ethnic groups, men, and younger people in pre-

vious UK studies.[20] Using 2 different case ascertainment periods between our boroughs may have invited some error into our results, particularly as we estimated the denominator from the same source. However, we believe that applying corrections based on estimates from the previous 1991 census would have only introduced greater error. The population at risk in City and Hackney may have varied slightly during the 2-year period, but we have no reason to believe that there was systematic bias in the estimates of our denominator population.

We chose a fairly broad ethnic categorization that retained differences with respect to differing immigration histories. Our decision to combine immigrants of Indian, Pakistani, and Bangladeshi origin may have concealed subtle differences between these ethnic groups, but by doing so we were able to increase power to detect possible generational and sex effects. We previously delineated the incidence of psychotic disorders for these groups separately.[17]

MEANING OF THE FINDINGS

Our results, which show increased rates for several migrant groups in both generations and across differing disorders, support a (socio)environmental component in the onset of psychotic disorders. Several studies across different settings and samples have now shown that rates in second-generation groups are elevated at least to the same extent as their first-generation counterparts.[19,21-24] Our findings advance the literature on ethnicity, immigration, and psychoses by showing that while both first- and second-generation BME groups are at greater risk for psychoses than the white British group, the magnitude of these risks varies by ethnicity. In our opinion, generational differences within ethnic groups are most parsimoniously explained by differences in the underlying age profile of the population at risk in each generational group. Our results are consistent with the hypothesis that for a given ethnic group, rates will be equal for first, second, or later generations given the same age profile. In our sample, the only second generation at significantly higher risk than its first-generation counterparts was the

black Caribbean group, primarily reflecting the older age profile in the first generation who predominantly migrated to the United Kingdom during the 1950s and 1960s. Although the magnitude of risk for the second-generation black Caribbean group in our sample was higher than for its first-generation counterparts, its IRRs were comparable to estimates from earlier research for first-generation black Caribbean immigrants,[7,25,26] whose age profile at the time more closely reflected that of the second-generation group in our sample. This suggests that within ethnic groups, the cumulative effect—or load—of factors that serves to increase the risk of psychoses in BME groups is probably similar across generations, although the exact specification of these factors will probably differ. For example, the pressures faced by first-generation black Caribbean immigrants in the 1950s and 1960s were very different from those faced by their second-generation counterparts in the 1990s and beyond.[27] Assuming for a moment that discrimination is a risk factor for psychoses in BME populations, our results support the notion that its cumulative effect is roughly similar across generations, although the form of discrimination has probably changed over generations.

It is worth considering the possible effect of discrimination on the risk of psychoses in more detail. While we propose that the load faced across generations *within* an ethnic group may be similar, the load *between* ethnic groups is almost certainly different. Recently, Veling et al[28] have shown a dose-response relationship between discrimination faced by various ethnic minority groups and increased risk of psychoses. Further, they[29] and others[30,31] have demonstrated that the risk of psychoses is greater for BME individuals living in neighborhoods where the BME group makes up a smaller proportion of the total population. In other words, risk increases as people become more isolated from their own ethnic group, suggesting that protective factors such as social support that buffers against discrimination and other forms of social pressures may be important. This is reinforced by recent findings showing that the incidence of psychoses is lower in neighborhoods indexed with greater levels of cohesion.[32,33]

The stress-vulnerability model is a potential mechanism to explain increased rates in migrants. The traditional explanation has been that alienation and suspicion engendered in the migrant by unfamiliar surroundings can lead to psychosis[1] or that immigration itself is a highly stressful life event.[34] It has been proposed that long-term experience of social defeat, defined as a subordinate position or outsider status, leads to sensitization of the mesolimbic dopamine system.[35] This hypothesis is thought to fit with the observation in several European countries that the risks for schizophrenia are highest among immigrant groups that are least successful.[36] It may also explain the heterogeneity in rates between and within ethnic groups in our sample. Although increased, the magnitude of risk for the Asian group was lower than for the black Caribbean and black African groups. It has been suggested that the more cohesive cultural, ethnic, and religious structure of Indian, Pakistani, and Bangladeshi communities may confer greater social support than in other groups that may otherwise share similar levels of discrimination.[6,37] That the

excess risk of psychoses for Asian immigrants in our sample appeared to be restricted to women provides anecdotal support for the social defeat hypothesis given the additional pressure of marginal status faced by some women in Indian, Pakistani, and Bangladeshi communities.

Recent reviews[36,37] have highlighted the absence of empirical support for several hypotheses that have previously been proposed to explain the increased rates of psychoses in BME groups.[38] Briefly, the continued weight of evidence argues against early methodological concerns regarding control for basic demographic confounders such as age and sex[4] or misdiagnosis of psychotic syndromes by white British clinicians.[39] Most modern studies, including ours, use strict diagnostic criteria via consensus from a panel of clinicians blinded to the ethnicity of the patient, save for the researcher presenting the clinical information.[2,17] Selective migration of prepsychotic individuals is an unlikely explanation given the complexity of the task and likely cognitive impairment in the prodrome.[40] Further, using a sophisticated natural experiment, Selten et al[41] have demonstrated that increased rates of schizophrenia in Surinamese immigrants to the Netherlands are not explained by selective migration. The migration effect is not due to higher rates in the émigrés' country of origin.[9-11] This, along with the finding that lifetime morbidity risks for parents of black Caribbean and white subjects with schizophrenia are similar[42] and the lack of neurodevelopment markers in black Caribbean people who develop schizophrenia,[43] has been the main evidence against a predominantly genetic explanation of increased incidence.

The observation of elevated risks for BME subgroups for both affective and nonaffective psychoses does not support the view that immigrants generally have an illness different from those in the host population. It is possible that different symptom profiles might be observed within our BME subgroups according to migration status. However, studies of stability of diagnosis over time, which demonstrate a trend for nonschizophrenic psychoses to subsequently change to schizophrenia, have not demonstrated differences between ethnic subgroups in the United Kingdom[44-46] or Holland.[47] Most importantly, the observation that affective psychoses among persons originating from the Indian subcontinent are not significantly elevated, whether immigrant or UK born, male or female, suggests differing protective factors for specific diagnostic categories among different ethnic subgroups and provides a possible direction for future research.

Given the lack of support for several of the aforementioned hypotheses, it is salient to suggest potential alternative explanations for the increased rates in BME groups in addition to the social defeat hypothesis. Substance misuse has been proposed to explain higher rates in BME groups,[37] but it would appear unlikely to be sufficient to explain this. In a small study of patients with schizophrenia, cannabis use was no more common among the black Caribbean group than among the white group.[48] Evidence from both the United Kingdom and the Netherlands suggests that the frequency of cannabis consumption in the general population is not increased in the black Caribbean group.[49,50] Veen et al[51] have shown that increased rates of schizophrenia in Moroccan and Surin-

amese immigrants in the Netherlands are unlikely to be due to substance abuse (not restricted to cannabis). Furthermore, 97% of first-episode patients in the Ætiology and Ethnicity in Schizophrenia and Other Psychoses study diagnosed with substance-induced psychosis were white British.[2]

Socioeconomic status may confound the relationship between BME status and psychoses. However, our study took place in a homogeneously deprived urban area of East London, providing some control for area-level deprivation. Further, we have previously shown that individual-level socioeconomic status cannot explain the increased rates of psychoses in BME groups in our sample.[17] We believe that other socioenvironmental characteristics often correlated with socioeconomic deprivation such as social fragmentation may be more etiologically relevant to the risk of psychoses for immigrants. Both protective and risk factors are likely to operate, perhaps differentially between ethnic groups and at multiple levels of organization (individual and neighborhood).

One putative factor in this respect may be family structure. Previous studies have postulated that the differentially increased rates in BME groups may be due in part to differences in family structure.[52,53] In the Caribbean, childrearing and family support are more reliant on an extended network of family ties. Migration may have led to changes in family structure for black Caribbean groups from this model to smaller family units.[54] Indeed, evidence from the 2001 census suggests that the black Caribbean population in the United Kingdom has the highest proportion of single-parent families of any ethnic group (48%).[55] This change may weaken traditional forms of social support, exposing people to more socially mediated pressures from the joint yet independent effects associated with immigration, urbanicity, and socioeconomic deprivation. Prolonged separation from a parent during childhood has been shown to be a risk factor for psychoses in the general population,[56] an experience that may be a marker for other stressors during childhood. Although the increased risk was approximately 3-fold across all ethnic groups, the prevalence of separation events was highest in the black Caribbean group. Thus, family structure (or changes to family structure induced by migration) may have a more profound effect in the black Caribbean population. This is supported by previous studies demonstrating that the morbid risk of schizophrenia for offspring of first- and second-generation black Caribbean immigrants was roughly 4 to 7 times greater than for their white counterparts in the United Kingdom.[42,57]

Family structure may also be important in explaining the differentially increased rates of psychoses for Asian women but not men. It is possible that such a change in family structure, together with pressures of sex segregation and female socialization experienced by some Asian women,[58] weakens protective factors that may have previously buffered against further socially mediated environmental stressors. Such protective factors should present an important direction for future psychiatric research.

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Correction

Errors in Abstract and Text. In the Original Article by Coid et al titled "Raised Incidence Rates of All Psychoses Among Migrant Groups: Findings From the East London First Episode Psychosis Study," published in the November issue of the *Archives* (2008;65[11]:1250-1258), there were errors in the abstract and text. In the "Results" section of the abstract, the third sentence should read, "Only black Caribbean second-generation individuals were at significantly greater risk compared with their first-generation counterparts (incidence rate ratio, 2.2; 95% confidence interval, 1.1-4.2)." In the second paragraph of "Nonaffective Psychoses" in the "Results" section of the text, the second sentence should read, "Second-generation black Caribbean immigrants were at greater risk for nonaffective psychoses than their first-generation counterparts (IRR, 2.2; 95% CI, 1.1-4.2; *P*=.02) after adjustment for age and sex, although rates were significantly elevated in both generations compared with the UK-born white British group."