TECHNICAL COMMENTARY

Migration

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Introduction

The term “migrant” usually refers to first generation migrants; people with a foreign place of birth, however, some studies assessing risk for schizophrenia also include locally born offspring, or second-generation migrants. While migrants usually make a conscious choice to leave their country to seek a better life elsewhere, refugees are often forced to flee their country, and many have experienced significant trauma along the way. Both migrants and refugees are included in this topic.

Any association observed between migration and increased risk of schizophrenia has stimulated a great deal of research and explanatory hypotheses. These include stress relating to migration (particularly for refugees) and settling into a new country, but also possible issues associated with discrimination and racism. Other explanations include a tendency for at-risk individuals to migrate and underlying genetic variances across cultures.

Method

We have included only systematic reviews with detailed literature search, methodology, and inclusion/exclusion criteria that were published in full text, in English, from the year 2000. Reviews were identified by searching the databases MEDLINE, EMBASE, and PsycINFO. Reviews with pooled data are prioritized for inclusion. Reviews reporting fewer than 50% of items on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA[1]) checklist have been excluded from the library. The evidence was graded guided by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach[2]. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

Results

We found 14 systematic reviews that met our inclusion criteria[3-16].

- Moderate quality evidence finds increased incidence and prevalence of schizophrenia in migrants compared to native-born individuals. The risk remains after adjusting for age, sex, and socio-economic status.
- Moderate quality evidence indicates the increased incidence of any non-affective psychosis was found in people who migrated between infancy and adolescence, but not during early adulthood (19-29 years).
- Moderate quality evidence finds a medium-sized increased risk of non-affective psychosis in refugees than in native-born people, a small to medium-sized increase in risk of non-affective psychosis in non-refugee migrants than in native-born people, and small increased risk of non-affective psychosis in refugees than in non-refugee migrants.
- Moderate quality evidence indicates the increased incidence of schizophrenia is apparent in both first- and second-generation migrant populations, particularly those from Eastern European and developing countries with high or medium income and for migrants with black skin.
- Moderate quality evidence finds a large increased risk of schizophrenia in black Caribbean and black African migrants in the UK, and in their descendants, compared with the white British population, and a medium-sized increased risk in Asian migrants.
- Moderate quality evidence finds no increase in subclinical psychotic symptoms or experiences in migrant groups living in the general community.

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Anderson KK, Edwards J

Age at Migration and the Risk of Psychotic Disorders: A Systematic Review and Meta-Analysis

Acta Psychiatrica Scandinavica 2020; 141(5) 410-420

View review abstract online

Comparison	**Relationship between age at migration and risk of non-affective psychosis in migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large samples, direct, some imprecision, inconsistent) indicates increased incidence of non-affective psychosis in people who migrated during infancy to adolescence, with no increased risk in early adulthood (19-29 years).**
Psychotic disorders in migrants	
3 population-level studies, 1 early intervention study, 1 outpatient study *Increased rates of non-affective psychosis in people who migrated during* Infancy (0 to 2 years): IRR = 1.85, 95%CI 1.39 to 2.47, $p < 0.05$, $I^2 = 75.5\%$, $p = 0.003$ Early childhood (3 to 6 years): IRR = 1.85, 95%CI 1.56 to 2.20, $p < 0.05$, $I^2 = 63.5\%$, $p = 0.027$ Middle childhood (7 to 12 years): IRR = 1.73, 95%CI 1.52 to 1.98, $p < 0.05$, $I^2 = 60.3\%$, $p = 0.039$ Adolescence (13 to 18 years): IRR = 1.67, 95%CI 1.17 to 2.37, $p < 0.05$, $I^2 = 94.8\%$, $p < 0.0001$ *No differences between people who migrated during early adulthood and native-born people;* Age 19 to 29 years: IRR = 0.93, 95%CI 0.60 to 1.44, $p > 0.05$, $I^2 = 97.6\%$, $p < 0.0001$	
Consistency in results‡	Inconsistent - rates expected to vary across regions
Precision in results§	Some imprecision
Directness of results‖	Direct, skin colour indirect

Bourque F, van der Ven E, Malla A

A meta-analysis of the risk for psychotic disorders among first- and second-generation immigrants

Migration

Psychological Medicine 2010; 21: 1-14 View review abstract online	
Comparison	**Incidence of schizophrenia in first- and second-generation migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large samples, direct, some imprecision, inconsistent) indicates increased incidence of schizophrenia for both first- and second-generation migrant populations, particularly for migrants with black skin and those living in the UK, The Netherlands, or Scandinavian countries.**

Schizophrenia in first-generation migrants

Significant increased incidence of schizophrenia for first-generation migrants;

19 population level studies, N = 5,508, incidence rate ratio = 2.3, 95%CI 2.0 to 2.7, Q_W = 1071, I^2 = 94.4%, $p < 0.01$

Subgroup analysis – no differences in risk between male and female first-generation migrants;

Males; incidence rate ratio = 2.1, 95%CI 1.7 to 2.6, Q_W = 654.2, I^2 = 94.8%, $p < 0.01$

Females; incidence rate ratio = 2.4, 95%CI 1.9 to 2.9, Q_W = 398.8, I^2 = 91.5%, $p < 0.01$

Q_B = 0.49, NS

Subgroup analysis – risk is highest for first-generation migrants where black skin is the majority in their country of origin;

Black; incidence rate ratio = 4.0, 95%CI 3.4 to 4.6, Q_W = 80.8, I^2 = 79%, $p < 0.01$

Other; incidence rate ratio = 2.0, 95%CI 1.6 to 2.5, Q_W = 97.8, I^2 = 84.7%, $p < 0.01$

White; incidence rate ratio = 1.8, 95%CI 1.6 to 2.1, Q_W = 175.4, I^2 = 89.7%, $p < 0.01$

Q_B = 57.2, $p < 0.01$

Subgroup analysis – risk is highest for first-generation migrants from black African and black Caribbean ethno-racial groups;

White; incidence rate ratio = 1.8, 95%CI 1.6 to 2.1, Q_W = 175.4, I^2 = 89.7%, $p < 0.01$

Black Caribbean; incidence rate ratio = 3.9, 95%CI 3.4 to 4.6, Q_W = 42.6, I^2 = 74.2%, $p < 0.01$

Black African; incidence rate ratio = 4.3, 95%CI 2.8 to 6.8, Q_W = 38.1, I^2 = 86.9%, $p < 0.01$

Asian; incidence rate ratio = 1.7, 95%CI 1.3 to 2.3, Q_W = 32.2, I^2 = 81.4%, $p < 0.01$

Middle East; incidence rate ratio = 2.3, 95%CI 1.4 to 4.0, Q_W = 31.9, I^2 = 87.5%, $p < 0.01$

Q_B = 61.8, $p < 0.01$

Subgroup analysis – risk is highest for first-generation migrants living in the UK, The Netherlands and Scandinavia;
Israel; incidence rate ratio = 1.5, 95%CI 1.1 to 2.1, Q_W = 12.5, I^2 = 51.9%, NS (trend)
The Netherlands; incidence rate ratio = 2.5, 95%CI 2.0 to 3.2, Q_W = 61.2, I^2 = 85.3%, $p < 0.01$
Scandinavia; incidence rate ratio = 2.3, 95%CI 1.9 to 2.7, Q_W = 185.0, I^2 = 92.4%, $p < 0.01$
UK; incidence rate ratio = 2.8, 95%CI 2.2 to 3.5, Q_W = 237.2, I^2 = 93%, $p < 0.01$
$Q_B = 9.5$, $p < 0.05$
Subgroup analysis – no significant difference in risk based on study setting;
Mixed urban/rural study setting; incidence rate ratio = 2.2, 95%CI 1.9 to 2.6, Q_W = 848.0, I^2 = 95.4%, $p < 0.01$
Urban study setting; incidence rate ratio = 2.7, 95%CI 2.0 to 3.6, Q_W = 179.1, I^2 = 88.8%, $p < 0.01$
$Q_B = 1.4$, NS
Subgroup analysis – no significant differences between studies with different sample acquisition methods;
First admission; incidence rate ratio = 2.2, 95%CI 1.9 to 2.6, Q_W = 961.2, I^2 = 95.5%, $p < 0.01$
First contact; incidence rate ratio = 2.9, 95%CI 2.1 to 4.0, Q_W = 103.56, I^2 = 84.5%, $p < 0.01$
$Q_B = 2.2$, NS
Subgroup analysis – no significant difference in risk based on diagnostic tool;
DSM-IV; incidence rate ratio = 2.0, 95%CI 1.5 to 2.5, Q_W = 20.4, I^2 = 65.7%, $p < 0.01$
ICD; incidence rate ratio = 2.2, 95%CI 1.9 to 2.7, Q_W = 570.2, I^2 = 94.6%, $p < 0.01$
Non-standardised; incidence rate ratio = 2.7, 95%CI 2.1 to 3.5, Q_W = 444.4, I^2 = 95.5%, $p < 0.01$
$Q_B = 3.0$, NS
Subgroup analysis – no significant differences between high and average/low quality studies;
High-quality studies; incidence rate ratio = 2.2, 95%CI 1.7 to 2.5, Q_W = 37.6, I^2 = 65.4%, $p < 0.01$
Average and low-quality studies; incidence rate ratio = 2.4, 95%CI 2.1 to 2.8, Q_W = 1010.5, I^2 = 95.4%, $p < 0.01$
$Q_B = 1.6$, NS
Schizophrenia in second-generation migrants
Significant increased incidence of schizophrenia for second-generation migrants;
10 population level studies, N = 4,422, incidence rate ratio = 2.1, 95%CI 1.8 to 2.5, Q_W = 302, I^2 = 91.1%, 4.5, $p < 0.01$

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Subgroup analysis – no differences in risk between male and female second-generation migrants; Males; incidence rate ratio = 2.5, 95%CI 1.8 to 3.4, Q_W = 56.7, I^2 = 78.8%, $p < 0.01$ Females; incidence rate ratio = 3.0, 95%CI 2.1 to 4.2, Q_W = 33.2, I^2 = 63.9%, $p < 0.01$ Q_B = 0.60, NS
Subgroup analysis – highest risk is for second-generation migrants where black skin is the majority in their country of origin; Black; incidence rate ratio = 5.4, 95%CI 3.2 to 8.8, Q_W = 28.4, I^2 = 78.9%, $p < 0.01$ Other; incidence rate ratio = 2.0, 95%CI 1.0 to 4.0, Q_W = 15.3, I^2 = 73.8%, $p < 0.01$ White; incidence rate ratio = 1.9, 95%CI 1.2 to 3.0, Q_W = 23.5, I^2 = 87.2%, $p < 0.01$ Q_B = 10.6, $p < 0.01$
Subgroup analysis – risk is highest for second-generation migrants from black African and black Caribbean ethno-racial groups; White; incidence rate ratio = 2.3, 95%CI 2.1 to 2.7, Q_W = 1.17, I^2 = 0%, *p* unclear Black Caribbean; incidence rate ratio = 5.8, 95%CI unclear, Q_W = 26.3, I^2 = 77.2%, $p < 0.01$ Black African; incidence rate ratio = 3.7, 95%CI 2.2 to 6.3, Q_W, I^2, NA – one effect size Asian; incidence rate ratio = 1.3, 95%CI 0.8 to 2.1, Q_W = 0.06, I^2 = 0%, *p* unclear Middle East; incidence rate ratio = 2.3, 95%CI 1.4 to 4.0, Q_W = 2.93, I^2 = 65.8%, $p < 0.01$ Q_B = 19.9, $p < 0.01$
Subgroup analysis – risk is highest for second-generation migrants living in the UK and The Netherlands; Israel; incidence rate ratio = 1.1, 95%CI 0.9 to 1.3, Q_W = 12.8, I^2 = 68.8%, $p < 0.05$ The Netherlands; incidence rate ratio = 3.0, 95%CI 2.1 to 4.4, Q_W = 7.2, I^2 = 30.7%, NS Scandinavia; incidence rate ratio = 1.8, 95%CI 1.6 to 2.0, Q_W = 46.0, I^2 = 84.8%, $p < 0.01$ UK; incidence rate ratio = 3.7, 95%CI 2.1 to 6.6, Q_W = 64.5, I^2 = 87.6%, $p < 0.01$ Q_B = 34.1, $p < 0.01$
Subgroup analysis – no significant difference in risk based on study setting; Mixed urban/rural study setting; incidence rate ratio = 1.7, 95%CI 1.5 to 2.0, Q_W = 48.2, I^2 = 83.4%, $p < 0.01$ Urban study setting; incidence rate ratio = 2.6, 95%CI 1.7 to 3.9, Q_W = 253.1, I^2 = 92.9%, $p < 0.01$ Q_B = 3.0, NS (trend)

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Subgroup analysis – risk is higher in second-generation samples from first contact studies First admission; incidence rate ratio = 1.6, 95%CI 1.3 to 1.8, Q_W = 149.8, I^2 = 91.3%, $p < 0.01$ First contact; incidence rate ratio = 3.2, 95%CI 2.1 to 4.7, Q_W = 67.6, I^2 = 80.8%, $p < 0.01$ Q_B = 10.6, $p < 0.01$
Subgroup analysis – no significant difference in risk based on diagnostic tool; DSM-IV; incidence rate ratio = 2.4, 95%CI 1.4 to 4.1, Q_W = 24.9, I^2 = 79.9%, $p < 0.01$ ICD; incidence rate ratio = 1.9, 95%CI 1.6 to 2.2, Q_W = 230.5, I^2 = 91.8%, $p < 0.01$ Non-standardised; incidence rate ratio = 3.7, 95%CI 0.4 to 31.2, Q_W = 4.18, I^2 = 76.07%, $p < 0.01$ Q_B = 1.1, NS
Subgroup analysis – no significant differences between high and average/low quality studies; High-quality studies; incidence rate ratio = 2.7, 95%CI 1.9 to 3.7, Q_W = 32.2, I^2 = 65.8%, $p < 0.01$ Average and low-quality studies; incidence rate ratio = 1.8, 95%CI 1.5 to 2.2, Q_W = 228.7, I^2 = 93.4%, $p < 0.01$ Q_B = 3.8, NS (trend)

Consistency in results	Inconsistent - rates expected to vary across regions
Precision in results	Some imprecision
Directness of results	Direct

Brandt L, Henssler J, Muller M, Wall S, Gabel D, Heinz A

Risk of Psychosis among Refugees: A Systematic Review and Meta-analysis

JAMA Psychiatry 2019; 76: 1133-40

View review abstract online

Comparison	**Risk of non-affective psychotic disorders in refugees and non-refugee migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large samples, inconsistent, imprecise, direct) suggests a small increase in risk of non-affective psychosis in refugees compared to non-refugee migrants. There was a small to medium-sized increase in risk in non-refugee migrants compared to native-born people, and a**

	medium-sized risk in refugees than native-born people.
Non-affective psychosis in refugees	
9 studies, N ~16 million *A medium-sized greater risk of non-affective psychosis in refugees than native-born people;* RR = 2.41, 95%CI 1.51 to 3.85, $p < 0.05$, $I^2 = 96.3\%$ *A small to medium-sized greater risk of non-affective psychosis in non-refugee migrants than native-born people;* RR = 1.92, 95%CI 1.02 to 3.62, $p < 0.05$, $I^2 = 97.0\%$ *A small, increased risk of non-affective psychosis in refugees than non-refugee migrants;* RR = 1.43, 95%CI 1.00 to 2.05, p = 0.05, $I^2 = 96.3\%$ Results were not moderated by study quality or refugee definition.	
Consistency in results	Inconsistent
Precision in results	Imprecise
Directness of results	Direct

Cantor-Graae E, Selten JP

Schizophrenia and migration: a meta-analysis and review

American Journal of Psychiatry 2005; 162(1): 12-24

View review abstract online

Comparison	**Risk of schizophrenia in migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large samples, direct, imprecise, some inconsistency) indicates increased incidence of schizophrenia for both first- and second-generation migrant populations, particularly for migrants from Eastern European and developing countries with high or medium income and for migrants with black skin.**
Schizophrenia in first-generation migrants	

Significant increased risk of schizophrenia for first-generation migrants; 18 population level studies, RR = 2.7, 95%CI 2.3 to 3.2, Q_W = 55.4, $p < 0.05$
Schizophrenia in second-generation migrants
Significant increased risk of schizophrenia for second-generation migrants; 4 population level studies, RR = 4.5, 95%CI 1.5 to 13.1, Q_W = 4.5, $p = 0.62$
Schizophrenia in first- and second-generation migrants
Significant increased risk of schizophrenia for first- and second-generation migrants; 18 population level studies, RR = 2.9, 95%CI 2.5 to 3.4, Q_W = 68.3, $p < 0.04$
Subgroup analysis investigating differences in incidence rates for migrants from developed vs. developing countries using the United Nations Conference on Trade and Development rating of developed vs developing. *Risk is significantly higher for first- or second-generation migrants from developing countries;* Developing countries; RR = 3.3, 95%CI 2.8 to 3.9 Developed countries; RR = 2.3, 95%CI 1.7 to 3.1 Q_B = 5.0, $p < 0.03$ Using the United Nations Conference on Trade and Development rating of developed market economies vs. Eastern European and developing countries – high- or medium-income vs. developing countries – low income. *Risk is significantly higher for first- or second-generation migrants from Eastern European and developing countries – high- or medium-income;* Developed market economies; RR = 2.0, 95%CI 1.5 to 2.8 Eastern European and developing countries – high- or medium-income; RR = 3.6, 95%CI = 3.0 to 4.4, *p* value not reported Developing countries – low income; RR = 2.8, 95%CI 2.0 to 3.8 Q_B = 12.5, $p = 0.002$
Subgroup analysis investigating differences in incidence rates for migrants with different skin colours. White = migrants from areas where the majority of the population is white (Europe, North America, North Africa, Turkey, Middle East, Australia). Black = migrants from areas where the majority of the population is black (the Caribbean, sub-Saharan Africa). Non-white/non-black = migrants from areas where the majority of the population cannot be classified as white or black (India, Pakistan, Asia, South America, Greenland).

Risk is significantly higher for first- or second-generation migrants with black skin; White; RR = 2.3, 95%CI 1.8 to 3.0 Black; RR = 4.8, 95%CI 3.7 to 6.2 Non-white/non-black; RR = 2.2, 95%CI 1.6 to 3.0 Q_B = 25.2, p < 0.0001	
Subgroup analysis investigating differences in incidence rates for migrants of different sex *No differences in risk between male and female first- or second-generation migrants* Male; RR = 2.5, 95%CI 2.0 to 3.2 Female; RR = 2.4, 95%CI 1.8 to 3.1 Q_B = 0.1, p < 0.72	
Consistency in results	Some inconsistency
Precision in results	Imprecise
Directness of results	Direct

Castillejos MC, Martín-Pérez C, Moreno-Küstner B

A systematic review and meta-analysis of the incidence of psychotic disorders: the distribution of rates and the influence of gender, urbanicity, immigration and socio-economic level

Psychological Medicine 2018; 48: 2101–15

View review abstract online

Comparison	**Incidence of schizophrenia in migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large sample, unable to assess consistency, imprecise, direct) suggests the incidence rate of schizophrenia or schizophreniform disorder is higher in migrants than in native-born populations.**
Schizophrenia or schizophreniform disorder in migrants	
A significant increased rate of schizophrenia or schizophreniform disorder in migrants; 4 population-based studies, IRR = 3.08, 95%CI 2.04 to 3.67, p < 0.01	

Consistency in results	Unable to assess – heterogeneity measure is not reported
Precision in results	Imprecise
Directness of results	Direct

Dapunt J, Kluge U, Heinz A

Risk of psychosis in refugees: a literature review

Translational Psychiatry 2017; 7: e1149

View review abstract online

Comparison	**Schizophrenia or other non-affective psychotic disorders in refugee groups vs. native-born populations and non-refugee migrants.**
Summary of evidence	**Moderate quality evidence (large samples, unable to assess consistency, some imprecision, direct) suggests small to medium-sized effects of increased incidence of psychotic disorders in refugee groups after migration (up to 10 years) compared to the native-born population and compared to non-refugee migrants. This risk was highest in men and in refugees from the Middle East.**

Non-affective psychotic disorders in migrants

1 Swedish cohort study, N = 1,337,790

The incidence rate in refugees was 126.4 per 100 000 person years compared to 80.4 in migrant groups and 38.5 in the Swedish-born population.

A significant, small to medium-sized effect of higher incidence of non-affective psychoses in the refugee group at follow-up (8.9 million person-years) compared to the Swedish-born population;

Adjusted for age and sex: HR = 3.61, 95%CI 2.87 to 4.53, $p < 0.05$

Adjusted for disposable income and population density: HR = 2.90, 95%CI 2.31 to 3.64, $p < 0.05$

A significant, small effect of higher incidence of non-affective psychoses in the refugee group at follow-up (8.9 million person-years) compared to non-refugee migrants;

Adjusted for age and sex: HR = 1.58, 95%CI 1.26 to 1.99, $p < 0.05$

Adjusted for disposable income and population density: HR = 1.66, 95%CI 1.32 to 2.09, $p < 0.05$

The risk was higher in men than in women, and higher in refugees from the Middle East than other

regions. 1 Canadian cohort study, N = 4,284,694 The incidence rate in refugees was 72.8 per 100 000 person years compared to 51.7 in migrant groups and 55.6 in the general population. *A significant, small effect of higher incidence of psychotic disorders in the refugee group at follow-up (10 years) compared to non-refugee migrants;* IRR = 1.27, 95%CI 1.04 to 1.56, $p < 0.05$ *The effect was not significant when compared to the general population;* IRR = 1.24, 95%CI 0.86 to 1.81, $p > 0.05$ The risk was higher in men than in women. 1 Danish cohort study, N = 145,695 *A significant, small effect of higher incidence of psychotic disorders in the refugee group at follow-up (8 years) compared to Danish-born people;* RR = 2.03, 95%CI 1.72 to 2.40, $p < 0.05$ The risk was higher in men than in women, and higher in refugees from the Middle East than other regions.	
Consistency in results	Unable to assess; no measure of consistency is reported
Precision in results	Precise, apart from HRs
Directness of results	Direct

Henssler J, Brandt L, Muller M, Liu S, Montag C, Sterzer P, Heinz A

Migration and schizophrenia: meta-analysis and explanatory framework

European Archives of Psychiatry and Clinical Neuroscience 2020; 270: 325-35

View review abstract online

Comparison	**Incidence of schizophrenia in migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (unclear sample size, inconsistency, precise, direct) suggests a small increased risk of schizophrenia or non-affective psychosis in migrants vs. native-born populations.**

Diagnosis of schizophrenia or non-affective psychosis	
A small effect of increased risk of schizophrenia in immigrants; 24 studies, N not reported, RR = 1.77, 95%CI 1.62 to 1.93, I^2 = 97% There were no moderating effects of first vs. second generation immigrants, study quality, register-based assessments, inpatient-only studies, adjusting for age, effect measure, observation period,	
Consistency in results	Inconsistent
Precision in results	Precise
Directness of results	Direct

Jongsma HE, Turner C, Kirkbride JB, Jones PB

International incidence of psychotic disorders, 2002-17: a systematic review and meta-analysis

The Lancet Public Health 2019; 4: e229-e44

View review abstract online

Comparison	**Incidence of schizophrenia in migrants vs. native-born populations.**
Summary of evidence	**Moderate to high quality evidence (large samples, inconsistent, precise, direct) suggests the incidence rate of schizophrenia is higher in migrants than in native-born populations.**
Schizophrenia in migrants	
A significant increased rate of schizophrenia or schizophreniform disorder in migrants; 6 studies (population and other designs), IRR = 1.41, 95%CI 1.15 to 1.75, $p < 0.05$, I^2 = 88%	
Consistency in results	Inconsistent
Precision in results	Precise
Directness of results	Direct

Kirkbride JB, Errazuriz A, Croudace TJ, Morgan C, Jackson D, Boydell J, Murray RM, Jones PB

Incidence of Schizophrenia and Other Psychoses in England, 1950–2009: A Systematic Review and Meta-Analyses

PLoS One 2012; 7(3): e1660

View review abstract online

Comparison	**Schizophrenia in ethnic migrant groups in the UK vs. native-born population.**
Summary of evidence	**Moderate quality evidence (unclear sample size, consistent, direct, imprecise) suggests a large effect of increased risk in black Caribbean and black African migrants, and in their descendants, compared with the white British-born population, and a medium size increased risk for Asian migrants.**
Schizophrenia in migrants	
A large size effect of increased risk of schizophrenia in black Caribbean and black African migrants, and their descendants; Black Caribbean: 5 studies (N unclear), RR = 5.60, 95%CI 3.40 to 9.20, I^2 = 77%, *p* not reported Black African: RR = 4.70, 95%CI 3.30 to 6.80, I^2 = 47%, *p* not reported *A medium size effect of increased risk of schizophrenia in Asian migrants;* 3 studies (N unclear), RR = 2.4, 95%CI 1.30 to 4.50, I^2 = 0.42, *p* not reported Authors reported similar findings for affective psychoses in black Caribbean and black African migrants, but not Asian migrants. Results were not explained by age and sex differences between ethnic minority groups and the general population.	
Consistency in results	Consistent
Precision in results	Imprecise
Directness of results	Direct

Leaune E, Dealberto MJ, Luck D, Grot S, Zeroug-Vial H, Poulet E, Brunelin J

Ethnic minority position and migrant status as risk factors for psychotic

symptoms in the general population: a meta-analysis **Psychological Medicine 2019; 49: 545-58** View review abstract online	
Comparison	**Psychotic symptoms and experiences in migrant groups vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large sample, inconsistent, imprecise, direct) finds no increase in psychotic symptoms or experiences in migrant groups in the general population.**
Psychotic symptoms and psychotic experiences	
No significant differences between groups in psychotic symptoms; 5 studies, N = 90,520, OR = 1.12, 95%CI 0.81 to 1.55, p = 0.504, I^2 = 86% *No significant differences between groups in psychotic symptoms;* OR = 1.09, 95%CI 0.76 to 1.57, p = 0.625	
Consistency in results	Inconsistent
Precision in results	Imprecise
Directness of results	Direct

Linscott R J, van Os J **An updated and conservative systematic review and meta-analysis of epidemiological evidence on psychotic experiences in children and adults: on the pathway from proneness to persistence to dimensional expression across mental disorders** **Psychological Medicine 2013; 43: 1133-1149** View review abstract online	
Comparison	**Subclinical psychotic symptoms in migrants vs. non-migrants**
Summary of evidence	**Moderate to low quality evidence (unclear sample size, inconsistent, imprecise, direct) suggests no differences in prevalence rates of subclinical psychotic symptoms in migrants compared to non-migrants.**

Subclinical psychotic symptoms in migrants	
No differences between groups; 3 studies, N not reported, OR = 0.83, 95%CI 0.36 to 1.89, $p > 0.05$, I^2 98%, $p < 0.01$	
Consistency in results	Inconsistent
Precision in results	Imprecise
Directness of results	Direct

McGrath J, Saha S, Welham J, El Saadi O, MacCauley C, Chant D

A systematic review of the incidence of schizophrenia: the distribution of rates and the influence of sex, urbanicity, migrant status and methodology

BMC Medicine 2004; 2: 13

View review abstract online

Comparison	**Incidence of schizophrenia in migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large samples, unable to assess precision, direct) suggests that the incidence of schizophrenia is higher in migrants compared to native-born individuals.**
Schizophrenia in migrants	
24 observational studies in total (worldwide), population level studies *Increased incidence of schizophrenia for migrants compared to native-born populations;* Median rate ratio (10% and 90% quantiles) = 4.6 (1.0 to 12.8) Difference in harmonic means; $F_{1,13} = 51.8$, $p < 0.001$	
Consistency in results	Rates expected to vary across regions
Precision in results	Unable to assess (quantiles)
Directness of results	Direct measure of migration status

Saha S, Chant D, Welham J, McGrath J

A systematic review of the prevalence of schizophrenia

PLoS Medicine / Public Library of Science 2005; 2(5): e141

View review abstract online

Comparison	**Prevalence of schizophrenia in migrants vs. native-born populations.**
Summary of evidence	**Moderate quality evidence (large samples, unable to assess precision, direct) suggests the prevalence of schizophrenia is higher in migrants than in native-born individuals.**
Schizophrenia in migrants	
5 observational studies, population level studies *Increased prevalence of schizophrenia for migrants compared to native-born populations;* Median rate ratio (10% and 90% quantiles) = 1.84 (0.86 to 6.41 = 7.5-fold difference) Difference in harmonic means; $F_{1,2} = 5.57$, $p = 0.04$	
Consistency in results	Rates were expected to vary across regions
Precision in results	Unable to assess (quantiles)
Directness of results	Direct

Selten JP, van der Ven E, Termorshuizen F

Migration and psychosis: a meta-analysis of incidence studies

Psychological Medicine 2020; 50: 303-13

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Comparison	**Non-affective psychotic disorders in migrants vs. native-born populations.**

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Migration

Summary of evidence	**Moderate to high quality evidence (large samples, unable to assess precision, direct) suggests the risk of non-affective psychosis is higher in migrants than in native-born individuals after adjusting for age, sex and SES.**
Non-affective psychotic disorders in migrants	
43 studies, N not reported, RR = 2.13, 95%CI 1.99 to 2.27, $p < 0.05$, $I^2 = 98\%$ This result was adjusted for age and sex. The result reduced slightly after adjusting for SES (RR = 1.55). Subgroup analysis found a personal or parental history of migration to Europe from countries outside Europe was associated with a higher effect size (RR = 2.94) than migration within Europe (RR = 1.88). The effect size was lower in Israel (RR = 1.22) and Canada (RR = 1.21). The effect size was highest among individuals with a black skin colour (RR = 4.19).	
Consistency in results	Inconsistent
Precision in results	Precise
Directness of results	Direct

Explanation of acronyms

CI = confidence interval, *F* = one-way ANOVA F-test for means, I^2 = the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance), OR = odds ratio, *p* = statistical probability of obtaining that result ($p < 0.05$ generally regarded as significant), Q_B = Q statistic (chi-square) for the test of differences in effect sizes between groups, Q_w = Q statistic (chi-square) for the test of heterogeneity in results within groups, RR = relative risk, vs. = versus, X^2 = chi square

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Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results; publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small.

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† Different effect measures are reported by different reviews.

Median rate ratio refers to the ratio between prevalence or incidence rates of two groups, based on the median rather than the mean. The median is often used as a better measure of central tendency than the mean when data are skewed. Harmonic means are also used when data are skewed and are appropriate for rate data.

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) that allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. 0.2 represents a small effect, 0.5 a medium effect, and 0.8 and over represents a large treatment effect[17].

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, an RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. An RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[18]. lnOR stands for logarithmic OR where a lnOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

Correlation coefficients (eg, r) indicate the strength of association or relationship between variables. They are an indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the dependent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change

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being in units of standard deviations to allow comparison across different scales.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

‡ Inconsistency refers to differing estimates of treatment effect across studies (i.e. heterogeneity or variability in results) which is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. I^2 is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent substantial heterogeneity and 75% to 100%: considerable heterogeneity. I^2 can be calculated from Q (chi-square) for the test of heterogeneity with the following formula;

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, this criteria should be relaxed[19].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available so is inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.

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