Psychological Medicine

cambridge.org/psm

Risk of first-episode psychosis in migrants to the Republic of Ireland

Brian O'Donoghue[1,2], John Lyne[3,4], Eric Roche[5], Nathan Mifsud[1,2], Laoise Renwick[6], Caragh Behan[4] and Mary Clarke[7,8]

[1]Orygen, Melbourne, Australia; [2]Centre for Youth Mental Health, University of Melbourne, Melbourne, Australia; [3]Wicklow Mental Health Services, Newcastle Hospital, Greystones, Co Wicklow, Ireland; [4]Royal College of Surgeons in Ireland, 123 St Stephens Green, Dublin, Ireland; [5]Cluain Mhuire Mental Health Services, Newtownpark Avenue, Blackrock, Co Dublin, Ireland; [6]Division of Nursing, Midwifery and Social Work, Faculty of Biology, Medicine and Health, University of Manchester, Manchester, England; [7]DETECT Early Intervention for Psychosis Service, Blackrock, Co Dublin, Ireland and [8]Department of Psychiatry, University College Dublin, Dublin, Ireland

Original Article

Cite this article: O'Donoghue B, Lyne J, Roche E, Mifsud N, Renwick L, Behan C, Clarke M (2023). Risk of first-episode psychosis in migrants to the Republic of Ireland. *Psychological Medicine* **53**, 468–475. https://doi.org/10.1017/S003329172100177X

Received: 22 September 2020
Revised: 16 April 2021
Accepted: 21 April 2021
First published online: 25 May 2021

Keywords:
Schizophrenia; migration; psychosis; incidence

Author for correspondence:
Brian O'Donoghue,
E-mail: brian.odonoghue@orygen.org.au

Abstract

Background. Migration is an established risk factor for developing a psychotic disorder in countries with a long history of migration. Less is known for countries with only a recent history of migration. This study aimed to determine the risk for developing a psychotic disorder in migrants to the Republic of Ireland.

Methods. We included all presentations of first-episode psychosis over 8.5 years to the DETECT Early Intervention for psychosis service in the Republic of Ireland (573 individuals aged 18–65, of whom 22% were first-generation migrants). Psychotic disorder diagnosis relied on SCID. The at-risk population was calculated using census data, and negative binomial regression was used to estimate incidence rate ratios.

Results. The annual crude incidence rate for a first-episode psychotic disorder in the total cohort was 25.62 per 100000 population at risk. Migrants from Africa had a nearly twofold increased risk for developing a psychotic disorder compared to those born in the Republic of Ireland (IRR = 1.83, 95% CI 1.11–3.02, $p = 0.02$). In contrast, migrants from certain Asian countries had a reduced risk, specifically those from China, India, Philippines, Pakistan, Malaysia, Bangladesh and Hong Kong (aIRR = 0.36, 95% CI 0.16–0.81, $p = 0.01$).

Conclusions. Further research into the reasons for this inflated risk in specific migrant groups could produce insights into the aetiology of psychotic disorders. This information should also be used, alongside other data on environmental risk factors that can be determined from census data, to predict the incidence of psychotic disorders and thereby resource services appropriately.

Introduction

Migration is a well-established risk factor for developing a psychotic disorder, with meta-analyses demonstrating that first-generation migrants have at least twice the risk of native-born populations (Selten, van der Ven, & Termorshuizen, 2020). This increased risk for psychotic disorders has been demonstrated in a range of countries with a long history of receiving migrants, such as the UK (Coid et al., 2008), Denmark (Cantor-Graae, Pedersen, McNeil, & Mortensen, 2003), Sweden (Zolkowska, Cantor-Graae, & McNeil, 2001), the Netherlands (Selten et al., 2001), Canada (Anderson, Cheng, Susser, McKenzie, & Kurdyak, 2015) and Australia (O'Donoghue et al., 2020). These studies have shown that the region of origin has a significant impact on developing a psychotic disorder, with the highest risk for migrants from developing countries, particularly Africa and the Caribbean (Selten et al., 2020).

However, less is known about the risk for psychotic disorders in migrants to countries with a more recent migration history. Just before the millennium turn, there was a marked change in migration patterns to the Republic of Ireland, with the first-ever period of sustained net in-migration observed in 1996 (Central Statistics Office, 2011; Gilmartin, 2012). Two main factors drove this increase in migration. First, economic growth with low unemployment rates offered skilled and unskilled migrants employment opportunities. Between 2002 and 2006, the number of migrants to Ireland increased by 87%, with the countries of birth most represented among migrants being Poland, Lithuania, Romania and India (Central Statistics Office, 2011). Second, there was an increase in people seeking asylum in Ireland, particularly from some Asian and African countries, with Nigeria, Pakistan and Zimbabwe most represented among those seeking asylum between 2000 and 2019 (International Protection Office, 2020).

Therefore, before 1996, the Republic of Ireland's population consisted predominantly of people born in Ireland, which was reflected within clinical populations at the time. For

CAMBRIDGE UNIVERSITY PRESS

example, a study that included all people aged 12 and above presenting with first-episode psychosis (FEP) between 1995 and 1999, from a defined catchment area within Dublin, consisted entirely of individuals born in Ireland (Clarke et al., 2006).

In 2006, the Dublin East Treatment and Early Care Team (DETECT) service was established. This Early Intervention for psychosis service covers a large catchment area in South Dublin and Wicklow. As it provides assessment and treatment for all cases of FEP within a culturally and ethnically diverse catchment area, it offers the opportunity to determine the risk profile of migrants for developing a psychotic disorder.

We aimed to determine (i) the risk for developing a psychotic disorder in migrants to the Republic of Ireland, first at the continental level and then at a smaller clustering of countries, and (ii) their risk of developing either a non-affective or affective psychotic disorder.

Methods

Setting and participants

This study was based at the DETECT Early Intervention (E.I.) for psychosis service. This service encompasses three mental health services in South Dublin and Co Wicklow, covering a total population of ~377000 people. We included all individuals with FEP aged 18–65 who presented to this service over 8.5 years between February 2006 and July 2014 inclusive.

The DETECT Service receives referrals from the local mental health service, general practitioners and Emergency Departments. Assessments are typically commenced within 72 hours of receipt of the referral. The E.I. service is embedded in the three local adult mental health services with defined catchment areas. There is one private hospital located within the catchment areas; its patients were referred to the E.I. service if they resided in the catchment area. Another private hospital in Dublin is located outside of the catchment area, but there was no arrangement for its eligible inpatients to be referred to the E.I. service.

Inclusion and exclusion criteria

We included all individuals fulfilling the criteria for a psychotic disorder, according to DSM-IV criteria, except those with a diagnosis of psychosis due to a general medical condition. FEP was defined as an incident case of psychosis where the individual had not previously experienced a psychotic episode and, before referral, had not previously taken antipsychotic medication for more than 30 days. Individuals with a concurrent substance use disorder were included.

Definitions

We defined a first-generation migrant as an individual born in another country other than the Republic of Ireland. We did not have sufficient information to determine whether an individual was a second-generation migrant, and therefore, any potential second-generation migrants were included in the reference group.

Instruments and diagnostic grouping

The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders-IV (SCID) was used to determine the psychotic disorder diagnosis and the presence of any concurrent substance use disorder (First, Spitzer, & Williams, 1995). Psychotic disorders were classified as either non-affective or affective psychotic disorders from the baseline SCID assessment. Non-affective psychotic disorders included schizophreniform disorder, schizophrenia, delusional disorder, brief psychotic disorder, psychotic disorder not otherwise specified and substance-induced psychotic disorder. Affective psychotic disorders included bipolar affective disorder, schizoaffective disorder and depression with psychosis.

Functioning was measured using the Global Assessment of Functioning (GAF), which is scored from 0 to 100 with higher scores indicating better functioning. The Beiser scale was used to determine the duration of untreated psychosis, defined as the period between onset of full-threshold psychotic symptoms and commencement of treatment (Beiser, Erickson, Fleming, & Iacono, 1993).

Census data

The catchment area consisted of 139 electoral divisions. While information pertaining to age, sex and place of birth of the population at the electoral division level (a relatively small geographical area) was available individually in each electoral division, it was not available collectively. For example, we could determine the portion of people born in Africa in each electoral division, but not the age and sex break down of those born in Africa. We requested this information from the CSO; unfortunately, our request could not be facilitated because it could potentially identify individuals at that specific level of detail. However, the Central Statistics Office provided us with information relating to the age, sex and place of birth for the entire catchment area, resulting in us being able to control for age and sex in the analysis, but we could not then control for neighbourhood-level characteristics such as social deprivation, fragmentation or population density. Age was organised into three categories: 16–24, 25–44 and 45–64.

Countries were classified according to two levels in the Irish census. The first grouping was according to the continental level and this consisting of the rest of Europe, Asia, Africa, the Americas and Australia, New Zealand and Oceania. Countries were then classified into groups of between three and seven neighbouring countries (except for Northern Ireland, which was grouped on its own). There were nine groups for Europe and two for each continent, except Australia, New Zealand and other Oceanic countries, which remained grouped. Information was not available at the individual level of the country of birth in the census.

The census is conducted in the Republic of Ireland every 5 years. The study period was from February 2006 to August 2014 and the census were conducted in Ireland in 2006, 2011 and 2016. In 2006, 20.4% of the population aged between 16 and 64 were born outside of the Republic of Ireland, this increased to 22.7% in the 2011 census and 24.4% in the 2016 census. Therefore, to account for this changing demographic in the general population over time, a variable pertaining to the 'Census period' was created. As the census is undertaken every 5 years, the data are most representative of the population for the year the census was undertaken and the preceding and following 2 years prior to the census. For example, the census conducted in 2006 would most closely represent the population from 1 January 2004 to 31 December 2008, while the 2011 census would most closely represent the population from 1 January 2009 to 31 December 2013.

https://doi.org/10.1017/S003329172100177X Published online by Cambridge University Press

The 8.5 years of the study period included three different census periods. The 2006 census corresponded to the first 2.92 years of the study period, and the population at risk for this period was determined and used as the denominator for all of the cases that presented within this time (February 2006–December 2008). The 2011 census corresponded to 5 years of the study period (1 January 2011 to 31 December 2013), and this was used for the denominator for all cases that presented within this time period and finally the 2016 census corresponded to 0.58 years of the study period (1 January 2014 to 31 July 2014). Thereby controlling for any potential changes in the total population over the long study period.

Statistical analysis

We used negative binomial regression to estimate incidence rate ratios, controlling for age, sex and census period. We used the likelihood ratio test to assess whether using a negative binomial regression model was justified compared to a Poisson regression model. In all cases, the additional parameter in the negative binomial regression model was necessary to account for overdispersion in the data. An interaction between sex and age was observed to be present in the data. The model with the interaction term for age and sex included provided a better fit (Likelihood-ratio test = 11.61, $p = 0.009$) and therefore, a model including this interaction term was used. Analysis was performed using the nbreg command with Stata version 14.

Ethical approval

This study received ethical approval from the St John of God Hospitaler Service Human Research Ethics Committee (ref ID665). As this study was an epidemiological study of all cases of FEP presenting within a defined period, a waiver of consent was granted by the ethics committee.

Results

Demographic and clinical characteristics of participants

A total of 573 individuals presented with FEP during the study period, of whom 55.8% ($n = 320$) were male, and 44.2% ($n = 253$) were female. A total of 77.7% ($n = 445$) of the cohort were born in the Republic of Ireland and 22.3% ($n = 128$) were first-generation migrants, specifically 13.4% ($n = 77$) were from other parts of Europe, 3.7% ($n = 21$) were from Asia, 2.8% ($n = 16$) were from Africa and 2.4% ($n = 14$) were from the Americas.

The median age at the time of presentation was 32 years (IQR 24–43 years). The majority of the cohort had never been married (68.5%, $n = 392$), and 63.4% ($n = 363$) were not in employment at the time of presentation. The mean GAF score at the time of presentation was 34.2 (S.D. 13.5). The median DUP was 3.0 months (IQR 1–15). Table 1 presents all demographic characteristics.

Incidences of first-episode psychotic disorder

The annual crude incidence rate for a first-episode psychotic disorder in the total cohort was 25.62 per 100000 population at risk (those aged 16–64 residing within the catchment area). The incidence rate for those born in the Republic of Ireland was 25.53 per 100000 population at risk, and for migrants, it was 25.96 per 100000 population at risk. There was no difference between the incidence rates in people born in the Republic of Ireland compared to migrants as a whole group (incidence rate ratio = 1.02, 95% CI 0.83–1.24, $p = 0.86$).

Risk for a psychotic disorder in migrants to Ireland: continental level

When examining the risk for a psychotic disorder at the continental level, we found that migrants from Africa had nearly a twofold increased risk of developing a psychotic disorder compared to those born in Ireland (IRR = 1.83, 95% CI 1.11–3.02, $p = 0.02$). This was also found in the sub-group of migrants from Africa with a non-affective first episode of psychosis (IRR = 1.78, 95% CI 1.00–3.18, $p = 0.049$). Migrants from the rest of Europe, Asia and the Americas did not have an increased risk of developing a psychotic disorder than those born in the Republic of Ireland. Table 2 presents the incidence rate ratios for developing a psychotic disorder according to the continent of birth.

Risk for a psychotic disorder in migrants to Ireland: smaller region level

The census in Ireland arranges countries into clusters of neighbouring countries and therefore this was the smallest area for which an at-risk population could be obtained and thus risks calculated. Migrants from African countries other than South Africa, Nigeria, Mauritius, Zimbabwe and the Democratic Republic of Congo had nearly three times the risk of Irish-born individuals developing FEP (aIRR = 2.90, 95% CI 1.59–5.28, $p = 0.001$) and this was a consistent finding for non-affective psychotic disorders (aIRR = 2.41, 95% CI 1.14–5.10, $p = 0.02$) and affective psychotic disorders (aIRR = 3.52, 95% CI 1.12–11.12, $p = 0.03$).

Migrants from the Asian countries of China, India, Philippines, Pakistan, Malaysia, Bangladesh and Hong Kong had a reduced risk of developing FEP (aIRR = 0.36, 95% CI 0.16–0.81, $p = 0.01$), and this association was only present for non-affective psychotic disorders (aIRR = 0.32, 95% CI 0.12–0.85, $p = 0.02$). While migrants from the other Asian countries had an increased risk (aIRR = 2.39, 95% CI 1.37–4.15, $p = 0.002$, this was present for both non-affective (aIRR = 1.92, 95% CI 0.95–3.88, $p = 0.07$) and affective psychotic disorders (aIRR = 3.19, 95% CI 1.17–8.67, $p = 0.02$).

Migrants from European countries that were not part of a clustering group had an increased risk of developing a psychotic disorder (aIRR = 2.60, 95% CI 1.08–6.29, $p = 0.03$), and this association was only present for those with a non-affective psychotic disorder (aIRR = 3.40, 95% CI 1.40–8.24, $p = 0.007$). Migrants from American countries, other than the USA and Canada, had an increased risk of developing a non-affective psychotic disorder (aIRR = 2.53, 95% CI 1.19–5.36, $p = 0.02$). The risks for developing a psychotic disorder, non-affective or affective, according to the smaller region of birth are presented in Table 3. The individual countries of birth of individuals who were classified into the non-specific cluster of countries, e.g. 'Other Europe' or 'Other Africa', are presented as a footnote in Table 3.

Discussion

Summary of findings

In this large, representative cohort of individuals with FEP, it was found that migrants from Africa had a twofold increased risk for

https://doi.org/10.1017/S003329172100177X Published online by Cambridge University Press

Table 1. Demographic characteristics according to migrant status

	Total cohort		Migrants		Native-born			
Sex	%	*n*	%	*n*	%	*n*	X^2, df	*p*
Male	55.8	320	56.3	72	55.7	248	0.011, 1	0.92
Female	44.2	253	43.8	56	44.3	197		
	Median	IQR	Median	IQR	Median	IQR	*Z*	
Age at presentation	32	24–43	31.0	24.0–39.0	33.0	24.0–43.0	−1.01	0.32
Age at onset	29.8	21.8–39.3	28.7	22.2–35.8	30.0	21.6–40.0	−0.91	0.37
Marital status	%	*n*	%	*n*	%	*n*	X^2, df	*p*
Never married	68.5	392	64.6	82	69.7	310	2.771, 4	0.60
Married/*de facto*	22.9	131	24.4	31	22.5	100		
Divorced	3.8	22	5.5	7	3.4	15		
Separated	4.4	25	5.5	7	4.0	18		
Widowed	0.3	2	0	0	0.4	2		
Employment status								
Employed	36.6	210	39.1	50	36.0	160	0.413, 1	0.52
Unemployed	63.4	363	60.9	78	64.0	285		
Place of birth								
Ireland	77.7	445						
Rest of Europe	13.4	77						
Asia	3.7	21						
Africa	2.8	16						
Americas	2.4	14						
Duration of untreated psychosis	Mean	S.D.	Mean	S.D.	Mean	S.D.	*t*-test, df	
Mean number of months (S.D.)	17.1	40.2	17.4	41.0	16.6	39.1		
	Median	IQR	Median	IQR	Median	IQR	Mann–Whitney	
Median number of months (IQR)	3	1–15	3	1–17	2	0–13	$Z = -0.59$	0.56
Diagnosis	%	*n*	%	*n*	%	*n*		
Schizophrenia-spectrum disorders								
Schizophreniform disorder	11.9	68	10.9	14	12.1	54		
Schizophrenia	28.3	162	29.7	38	27.9	124		
Schizoaffective disorder	1.6	9	0.8	1	1.8	8		
Delusional disorder	11.7	67	11.7	15	11.7	52		
Affective psychotic disorders								
Depression with psychosis	9.8	56	10.9	14	9.4	42		
Bipolar affective disorder	10.8	62	11.7	15	10.6	47		
Other psychotic disorders								
Substance-induced psychotic disorders	11.3	65	10.9	14	11.5	51		
Brief psychotic disorder	7.9	45	8.6	11	7.6	34		
Psychosis NOS	3.8	22	2.3	3	4.3	19		
Concurrent diagnoses								
Substance abuse or dependence	38.4	220	40.6	52	37.8	168	0.347, 1	0.56
Functioning	Mean	S.D.	Mean	S.D.	Mean	S.D.	*t*-test, df	*p*
GAF total	34.2	13.5	33.8	14.0	34.4	13.3	0.38, 558	0.70

https://doi.org/10.1017/S003329172100177X Published online by Cambridge University Press

Table 2. Participant birthplace by region

Birthplace	Total FEP cohort ($N = 573$)					Non-affective FEP ($n = 429$)					Affective FEP ($n = 144$)				
	N	%	aIRR	95% CI	*p*	*n*	%	aIRR	95% CI	*p*	*N*	%	aIRR	95% CI	*p*
Ireland	445	77.7	Ref	–	–	334	77.9	Ref	–	–	111	77.1	Ref	–	–
Rest of Europe	77	13.4	0.89	0.70–1.14	0.37	60	14.0	0.92	0.69–1.21	0.53	17	11.8	0.83	0.50–1.39	0.48
Asia	21	3.7	0.92	0.59–1.42	0.70	15	3.5	0.85	0.50–1.42	0.53	6	4.2	1.15	0.50–2.63	0.74
Africa	16	2.8	1.83	1.11–3.02	0.02	12	2.8	1.78	1.00–3.18	0.049	4	2.7	1.99	0.73–5.40	0.18
Americas	14	2.4	1.17	0.68–1.99	0.57	8	1.9	0.77	0.36–1.62	0.49	6	4.2	2.07	0.91–4.72	0.08
Australia, NZ and Oceania	0	0	-	-	-	0	0	-	-	0.99	0	0	-	-	-

Note. Controlled for sex, age and census period.

developing a psychotic disorder. In contrast, migrants from certain Asian countries, specifically China, India, Philippines, Pakistan, Malaysia, Bangladesh and Hong Kong, had reduced risk. These findings cohere with the international literature that suggests migrants from developing countries are at the highest risk (Selten et al., 2020). These results also replicate recent findings from Australia that demonstrated that migrants from Africa have the greatest risk, while migrants from Asia can have reduced risk (O'Donoghue et al., 2020).

Clinical implications

Several important clinical implications arise from these findings. The first relates to the planned national rollout of E.I. for psychosis services throughout the Republic of Ireland. At present, the Government of Ireland funds mental health services on a per capita basis, with a recommendation of one psychiatrist per 25000 of the population (Government of Ireland, 2006). However, psychiatric needs greatly vary according to the characteristics of the catchment area. For example, the most socially deprived neighbourhoods in Ireland have over three times the incidence rate of psychotic disorders (O'Donoghue et al., 2016). Our study's findings contribute further information to help understand and ultimately predict the variation in the incidence rate of psychotic disorders. Other neighbourhood factors, such as social fragmentation and population density/urbanicity have been shown to be associated with the incidence of psychotic disorders in Ireland (Kelly et al., 2010; Omer et al., 2014). Therefore, there should now be sufficient information to develop a predictive model for the incidence of psychotic disorders according to the geographical area in Ireland, similar to Psymaptic in the UK (Kirkbride et al., 2013; McDonald et al., 2021), that could inform the allocation of resources for the national roll-out of E.I. services.

This study's findings also emphasise the importance of E.I. services and adult mental health services providing culturally sensitive service accessible to migrants; for instance, having the time and resources for the use of interpreters if required. These recommendations are in line with the 'Strategy and Action Plan for Refugee and Migrant Health' published by the World Health Organization and this includes ensuring that health systems have the capacity to respond to the needs of migrants and refugees (Villarroel, Hannigan, Severoni, Puthoopparambil, & MacFarlane, 2019).

Possible explanation for findings

We need to develop an understanding as to why the African migrant group have an increased risk, while migrants from certain Asian countries have a reduced risk. One hypothesis is that migrants from Africa may be more likely to be seeking asylum or fleeing from countries affected by war, exposing them to adversity and trauma pre-, during and post-migration (Dykxhoorn & Kirkbride, 2019), which are known risk factors for developing a psychotic disorder (Longden & Read, 2016).

Another hypothesis is that experiencing discrimination in the host country can precipitate the onset of a psychotic disorder (Pearce, Rafiq, Simpson, & Varese, 2019). A high proportion of migrants to Ireland can experience harassment and discrimination in accessing employment, housing and healthcare, with migrants from Africa reporting the highest level (McGinnity, O'Connell, Quinn, & Williams, 2006). A meta-analysis of the risk for psychotic disorders in migrants found that those with

https://doi.org/10.1017/S003329172100177X Published online by Cambridge University Press

Table 3. Smaller region-level analysis

	Total FEP cohort ($N = 567$)					Non-affective FEP ($n = 423$)					Affective FEP ($n = 144$)				
Region	*N*	%	aIRR	95% CI	*p*	*n*	%	aIRR	95% CI	*p*	*n*	%	aIRR	95% CI	*p*
Republic of Ireland	445	78.5	Ref	–	–	334	79.0	Ref	–		111	77.1	Ref	–	–
Northern Ireland	2	0.4	0.24	0.06–0.96	0.04	1	0.2	0.16	0.02–1.15	0.07	1	0.7	0.47	0.06–3.34	0.45
England, Scotland and Wales	27	4.8	0.88	0.59–1.31	0.52	19	4.5	0.86	0.54–1.37	0.52	8	5.6	0.68	0.28–1.66	0.39
Poland, Lithuania, Romania	13	2.3	0.70	0.40–1.22	0.21	8	1.9	0.70	0.37–1.32	0.27	5	3.5	1.22	0.49–3.00	0.67
Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France	6	1.1	0.90	0.40–2.01	0.79	6	1.4	1.17	0.52–2.63	0.70	0	0	–	–	–
Germany, Hungary, Italy	8	1.4	1.03	0.51–2.08	0.93	7	1.7	1.18	0.56–2.50	0.66	1	0.7	0.57	0.08–4.09	0.58
Latvia, Netherlands, Sweden, Portugal, Spain	6	1.1	0.96	0.43–2.15	0.92	4	0.9	0.84	0.31–2.26	0.73	2	1.4	1.37	0.34–5.56	0.66
Slovakia, Slovenia, Greece, Luxembourg, Malta	3	0.5	1.80	0.58–5.59	0.31	3	0.7	2.34	0.75–7.30	0.14	0	0	–	–	–
Russia, Ukraine, Moldova	3	0.5	0.45	0.06–3.18	0.42	3	0.7	0.59	0.08–4.20	0.60	0	0	–	–	–
Other Europe	5	0.9	2.60	1.08–6.29	0.03	5	1.2	3.40	1.40–8.24	0.007	0	0	–	–	–
South Africa, Nigeria, Mauritius, Zimbabwe, Congo(Dem Rep)	4	0.7	0.85	0.32–2.29	0.75	3	0.7	0.84	0.27–2.62	0.77	1	0.7	0.92	0.13–6.59	0.93
Other Africa	12	2.1	2.90	1.59–5.28	0.001	9	2.1	2.41	1.14–5.10	0.02	3	2.1	3.52	1.12–11.12	0.03
China, India, Philippines, Pakistan, Malaysia, Bangladesh, Hong Kong	6	1.1	0.36	0.16–0.81	0.01	4	0.9	0.32	0.12–0.85	0.02	2	1.4	0.53	0.13–2.17	0.38
Other Asian countries	13	2.3	2.39	1.37–4.15	0.002	9	2.1	1.92	0.95–3.88	0.07	4	2.8	3.19	1.17–8.67	0.02
USA, Canada	7	1.2	0.91	0.42–1.91	0.79	3	0.7	0.52	0.17–1.61	0.25	4	2.8	2.11	0.78–5.72	0.14
Other America	7	1.2	1.92	0.91–4.06	0.09	5	1.2	2.53	1.19–5.36	0.02	2	1.4	2.36	0.58–9.60	0.23
Australia, New Zealand and Other Oceanic countries	0	0	–	–	–	0	0	–	–	–	0	0	–	–	–

There were missing data for six people for place of birth at this level. Controlled for sex. age and census period.
Other Europe: Albania, Belarus, Georgia, Romania, Turkey.
Other Africa: Algeria, Angola, Kenya, Lesotho, Libya, Morocco, Rwanda, Sierra Leone, Tanzania.
Other Asia: Armenia, Iran, Japan, Mongolia, Philippines, Saudi Arabia, Singapore, Thailand.
Other America: Argentina, Brazil, Paraguay, Venezuela.

black skin had the highest risk (Selten et al., 2020) and it has been hypothesised that migrants are at greater risk of discrimination and social isolation where it is visibly evident that they belong to a minority group. There is also an alternative, or additional, factor that might explain this increased risk, as vitamin D deficiency has been implicated in the aetiology of psychotic disorders and migrants with darker skin are more susceptible to vitamin D deficiency when they move to high-latitude countries (Dealberto, 2007). In sum, despite migration being a robust and replicated risk factor for developing a psychotic disorder, there is still very limited research into understanding the underlying causes.

Risk according to diagnostic categories

The findings relating to the non-affective psychotic disorder sub-group mirrored that of the total cohort, however, this was not always the case for those with an affective psychotic disorder. Although, on closer inspection, the direction and size of the incidence rate ratios tended to be similar in the affective psychotic disorder group to the non-affective and total psychotic disorder group but with the associations were lacking statistical significance. Therefore, it is possible that there was a lack of statistical power to detect an association, especially considering that the sub-group with an affective psychotic disorder was considerably smaller and represented less than one-quarter of the total cohort. A recent meta-analysis found that the established environmental risk factors for non-affective psychotic disorders were also risk factors for affective psychotic disorders, specifically bipolar affective disorder and depression (Rodriguez et al., 2021). The study found that individuals from ethnic minorities had nearly a two-fold increased risk for an affective psychotic disorder. However, the study concluded that research on environmental risk factors in affective psychotic disorders is scarce.

Strengths and limitations

Our study's strengths are first that it was a large, representative cohort of people presenting with FEP within a defined catchment area. Apart from the public mental health service, there are limited options for alternative services for the treatment of psychotic disorders. Although it is possible that cases were missed by either attending the other private hospital in Dublin or individuals not presenting for assessment or treatment at all. A further strength is that people aged up to 65 were included. Additionally, non-affective and affective psychotic disorders were included, as other FEP cohorts have often capped the age at lower ages, such as 24 years with the EPPIC service in Australia (McGorry, Edwards, Mihalopoulos, Harrigan, & Jackson, 1996) or the 35 years with the Lambeth Early Onset (LEO) service in the UK (Power et al., 2007).

However, the findings need to be considered within certain limitations. First, while the study's population was a large FEP cohort, the migrant groups were small, especially those examined at the smaller region level. Second, it is possible that certain migrant groups may not have sought help, thereby potentially underestimating the risk in these migrant groups. Third, the census data were used to determine the at-risk population and it is possible that certain migrants may not have registered their presence in the Republic of Ireland if they were resident without the correct visa or asylum status. If this was the case, we would have under-estimated the at-risk population, artificially inflating the risk in these migrant groups. Furthermore, we only included migrant status as a risk factor and did not examine ethnicity. Ethnic minorities, who have an inflated risk for psychotic disorders, were allocated to the reference group of 'born in Ireland' if they were not migrants. For example, one-third (33.6%) of individuals who identified as being of African ethnicity were born in the Republic of Ireland according to the 2011 census (Central Statistics Office, 2011). If this group was indeed at higher risk of developing a psychotic disorder, their inclusion in the reference group would have deflated the observed risk in the migrant cases. Finally, we were unable to control for neighbourhood factors such as social deprivation or population density in the analysis and considering that migrants are more likely to experience poverty and live in a deprived area (Lelkes, 2011), this may have confounded the findings.

Conclusion

Migrants to the Republic of Ireland from Africa represent a group with an increased risk for developing FEP. Further research into the factors that inflate this risk could lead to insights into the aetiology of psychotic disorders. This information of an increased risk in specific migrant groups should be used, alongside other information on environmental risk factors that can be determined from census data, to more accurately predict the incidence of psychotic disorders and resource services.

Financial support. BOD was supported by an NHMRC Early Career Fellowship (APP1142045).

Conflict of interest. None.

References

Anderson, K. K., Cheng, J., Susser, E., McKenzie, K. J., & Kurdyak, P. (2015). Incidence of psychotic disorders among first-generation immigrants and refugees in Ontario. *Canadian Medical Association Journal*, *187*(9), E279–E286. doi: 10.1503/cmaj.141420

Beiser, M., Erickson, D., Fleming, J. A., & Iacono, W. G. (1993). Establishing the onset of psychotic illness. *American Journal of Psychiatry*, *150*(9), 1349–1354. doi: 10.1176/ajp.150.9.1349.

Cantor-Graae, E., Pedersen, C. B., McNeil, T. F., & Mortensen, P. B. (2003). Migration as a risk factor for schizophrenia: A Danish population-based cohort study. *British Journal of Psychiatry*, *182*(2), 117–122. doi: 10.1192/bjp.182.2.117.

Central Statistics Office. (2011). *Census* 2011 *results: Profile* 6 *migration and diversity – a profile of diversity in Ireland*. Retrieved from https://www.cso.ie/en/csolatestnews/pressreleases/2012pressreleases/pressreleasecensus2011profile6migrationanddiversity/.

Clarke, M., Whitty, P., Browne, S., McTigue, O., Kamali, M., Gervin, M., … O'callaghan, E. (2006). Untreated illness and outcome of psychosis. *British Journal of Psychiatry*, *189*, 235–240. doi: 10.1192/bjp.bp.105.014068.

Coid, J. W., Kirkbride, J. B., Barker, D., Cowden, F., Stamps, R., Yang, M., & Jones, P. B. (2008). Raised incidence rates of all psychoses among migrant groups: Findings from the East London first episode psychosis study. *Archives of General Psychiatry*, *65*(11), 1250–1258.

Dealberto, M. J. (2007). Why are immigrants at increased risk for psychosis? Vitamin D insufficiency, epigenetic mechanisms, or both? *Medical Hypotheses*, *68*(2), 259–267. doi: 10.1016/j.mehy.2006.07.040.

Dykxhoorn, J., & Kirkbride, J. B. (2019). Psychoses sans Frontieres: Towards an interdisciplinary understanding of psychosis risk amongst migrants and their descendants. *Epidemiology and Psychiatric Sciences*, *28*(2), 146–152. doi: 10.1017/S2045796018000501.

First, M., Spitzer R.L., Gibbon M., & Williams J.B. (1995). *Structured clinical interview for DSM-IV axis* 1 *disorders*: New York State Psychiatric Institute.

Gilmartin, M. (2012). *The changing landscape of Irish migration*, 2000–2012. Retrieved from https://www.maynoothuniversity.ie/sites/default/files/assets/document/WP69_The_changing_face_of_Irish_migration_2000_2012_0.pdf.

https://doi.org/10.1017/S003329172100177X Published online by Cambridge University Press

Government of Ireland. (2006). *A vision for change*. Retrieved from www.dohc.ie.

International Protection Office, Government of Ireland. (2020). *International Protection Office Statistics*. http://ipo.gov.ie.

Kelly, B. D., O'Callaghan, E., Waddington, J. L., Feeney, L., Browne, S., Scully, P. J., … Larkin, C. (2010). Schizophrenia and the city: A review of literature and prospective study of psychosis and urbanicity in Ireland. *Schizophrenia Research*, *116*(1), 75–89. doi: 10.1016/j.schres.2009.10.015.

Kirkbride, J. B., Jackson, D., Perez, J., Fowler, D., Winton, F., Coid, J. W., … Jones, P. B. (2013). A population-level prediction tool for the incidence of first-episode psychosis: Translational epidemiology based on cross-sectional data. *British Medical Journal Open*, *3*, 2. doi: 10.1136/bmjopen-2012-001998.

Lelkes, O., & Zolyomi, E. (2011). *Poverty and social exclusion of migrants in the European Union*. Retrieved from https://www.euro.centre.org/publications/detail/396:.

Longden, E., & Read, J. (2016). Social adversity in the etiology of psychosis: A review of the evidence. *American Journal of Psychotherapy*, *70*(1), 5–33. doi: 10.1176/appi.psychotherapy.2016.70.1.5.

McDonald, K., Ding, T., Ker, H., Dliwayo, T. R., Osborn, D. P. J., Wohland, P., … Kirkbride, J. B. (2021). Using epidemiological evidence to forecast population need for early treatment programmes in mental health: A generalisable Bayesian prediction methodology applied to and validated for first-episode psychosis in England. *The British Journal of Psychiatry*, 1–9. Published online ahead of print. doi: 10.1192/bjp.2021.18.

McGinnity, F., O'Connell, P., Quinn, E., & Williams, J. (2006). *Migrants' experience of racism and discrimination in Ireland*. Retrieved from https://www.esri.ie/publications/migrants-experience-of-racism-and-discrimination-in-ireland-survey-report:.

McGorry, P. D., Edwards, J., Mihalopoulos, C., Harrigan, S. M., & Jackson, H. J. (1996). EPPIC: An evolving system of early detection and optimal management. *Schizophrenia Bulletin*, *22*(2), 305–326. doi: 10.1093/schbul/22.2.305.

O'Donoghue, B., Downey, L., Eaton, S., Mifsud, N., Kirkbride, J. B., & McGorry, P. (2020). Risk of psychotic disorders in migrants to Australia. *Psychological Medicine*, 1–9. Published online ahead of print. doi: 10.1017/S0033291719004100.

O'Donoghue, B., Lyne, J. P., Renwick, L., Lane, A., Madigan, K., Staines, A., … Clarke, M. (2016). Neighbourhood characteristics and the incidence of first-episode psychosis and duration of untreated psychosis. *Psychological Medicine*, *46*(7), 1367–1378. doi: 10.1017/S003329171500286X.

Omer, S., Kirkbride, J. B., Pringle, D. G., Russell, V., O'Callaghan, E., & Waddington, J. L. (2014). Neighbourhood-level socio-environmental factors and incidence of first episode psychosis by place at onset in rural Ireland: The Cavan-Monaghan First Episode Psychosis Study [CAMFEPS]. *Schizophrenia Research*, *152*(1), 152–157.

Pearce, J., Rafiq, S., Simpson, J., & Varese, F. (2019). Perceived discrimination and psychosis: A systematic review of the literature. *Social Psychiatry and Psychiatric Epidemiology*, *54*(9), 1023–1044. doi: 10.1007/s00127-019-01729-3.

Power, P., McGuire, P., Iacoponi, E., Garety, P., Morris, E., Valmaggia, L., … Craig, T. (2007). Lambeth Early Onset (LEO) and Outreach & Support in South London (OASIS) service. *Early Intervention in Psychiatry*, *1*(1), 97–103. doi: 10.1111/j.1751-7893.2007.00010.x.

Rodriguez, V., Alameda, I., Trotta, G., SpinazzolaE., Marino, P., Matheson, S., … Vassos, E. (2021). Environmental risk factors in bipolar disorder and psychotic depression: A systematic review and metaanalysis of prospective studies. *Schizophrenia Bulletin*. Published online ahead of print. doi: 10.1093/schbul/sbaa197.

Selten, J. P., van der Ven, E., & Termorshuizen, F. (2020). Migration and psychosis: A meta-analysis of incidence studies. *Psychological Medicine*, *50*(2), 303–313. doi: 10.1017/S0033291719000035.

Selten, J. P., Veen, N., Feller, W., Blom, J. D., Schols, D., Camoenie, W., … Kahn, R. (2001). Incidence of psychotic disorders in immigrant groups to The Netherlands. *British Journal of Psychiatry*, *178*, 367–372. doi: 10.1192/bjp.178.4.367.

Villarroel, N., Hannigan, A., Severoni, S., Puthoopparambil, S., & MacFarlane, A. (2019). Migrant health research in the Republic of Ireland: A scoping review. *BMC Public Health*, *19*(1), 324. doi: 10.1186/s12889-019-6651-2.

Zolkowska, K., Cantor-Graae, E., & McNeil, T. F. (2001). Increased rates of psychosis among immigrants to Sweden: Is migration a risk factor for psychosis? *Psychological Medicine*, *31*(4), 669–678. doi: 10.1017/s0033291701003786.

https://doi.org/10.1017/S003329172100177X Published online by Cambridge University Press