Research paper

Refugee status and the incidence of affective psychotic disorders and non-psychotic bipolar disorder: A register-based cohort study of 1.3m people in Sweden

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ABSTRACT

Background: Refugees are at increased risk of non-affective psychotic disorders, but it is unclear whether this extends to affective psychotic disorders [APD] or non-psychotic bipolar disorder [NPB].
Methods: We conducted a nationwide cohort study in Sweden of all refugees, non-refugee migrants and the Swedish-born population, born 1 Jan 1984–31 Dec 2016. We followed participants from age 14 years until first ICD-10 diagnosis of APD or NPB. We fitted Cox proportional hazards models to estimate hazard ratios [HR] and 95 % confidence intervals [95%CI], adjusted for age, sex and family income. Models were additionally stratified by region-of-origin.
Results: We followed 1.3 million people for 15.1 million person-years, including 2428 new APD cases (rate: 16.0 per 100,000 person-years; 95%CI: 15.4–16.7) and 9425 NPB cases (rate: 63.8; 95%CI: 62.6–65.1). Rates of APD were higher in refugee (HR$_{adjusted}$: 2.07; 95%CI: 1.55–2.78) and non-refugee migrants (HR$_{adjusted}$: 1.40; 95%CI: 1.16–1.68), but lower for NPBs for refugee (HR$_{adjusted}$: 0.24; 95%CI: 0.16–0.38) and non-refugee migrants (HR$_{adjusted}$: 0.34; 95%CI: 0.28–0.41), compared with the Swedish-born. APD rates were elevated for both migrant groups from Asia and sub-Saharan Africa, but not other regions. Migrant groups from all regions-of-origin experienced lower rates of NPB.
Limitations: Income may have been on the causal pathway making adjustment inappropriate.
Conclusions: Refugees experience elevated rates of APD compared with Swedish-born and non-refugee migrants, but lower rates of NPB. This specificity of excess risk warrants clinical and public health investment in appropriate psychosis care for these vulnerable populations.

1. Introduction

The United Nations High Commissioner for Refugees [UNHCR] estimates that there are currently 32.5 million refugees in the world (UNCHR, 2022a), the highest number ever recorded, and propelled by conflicts in sub-Saharan Africa, Myanmar, Afghanistan and Ukraine, this number continuous to climb (UNCHR, 2022b).

Refugees are usually distinct from other migrants in that they have been forced to leave their countries of origin and seek "international protection because of a serious threat to their life, physical integrity or freedom…as a result of persecution, armed conflict, violence or serious public disorder" (UNHCR, 2018). By contrast, non-refugee migrants

"move for economic or other reasons". Consequently, while non-refugee migrant journeys are often stressful, refugees are likely to contend with even more challenges before, during and after migration (Brandt et al., 2019). Some examples of these experiences are human rights violations or persecution (pre-migratory), treacherous journeys to refuge (peri-migratory), waiting of for asylum and low proficiency in the language (post-migratory), in addition to the general social determinants of mental health that are more common amongst refugees such as social isolation, poverty or ethnic discrimination when in their host-country (Björkenstam et al., 2022; Blackmore et al., 2020; Brandt et al., 2019; Finklestein and Solomon, 2009; Tinghög et al., 2017).

It is well established that non-refugee migrant populations

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experience higher incidence rates of both non-affective psychotic disorders [NAPDs] and affective psychotic disorders [APDs] (Dykxhoorn et al., 2019b; O'Donoghue et al., 2021; Selten et al., 2020). Affective psychotic disorders are categorized into bipolar with psychosis and psychotic depression (Dykxhoorn et al., 2019b; Salvatore et al., 2007). There is also evidence that refugees have a 2.5 times greater risk of NAPDs than native-populations, and a 1.4 times greater risk than non-refugee migrants overall (Brandt et al., 2019; Hollander et al., 2016). However, whether this also applies for APD remains unclear. To understand the reasons for the increased vulnerability to psychosis in migrant groups, it is important consider the different experiences of refugees and non-refugee migrants (Dapunt et al., 2017; Dykxhoorn et al., 2019b; Jongsma et al., 2021).

The primary aim of this study was to investigate whether refugees were at greater risk of APDs compared with non-refugee migrants and the native-born population, using nationwide, longitudinal linked population registers in Sweden. We hypothesised that this would be the case. Our secondary aim was to investigate whether a refugee's region of origin had an impact on the hypothesised increased risk of APDs compared with non-refugee migrants and the Swedish-born population. We expected that any increased risk would be highest in refugees from sub-Saharan Africa.

2. Methods

2.1. Data source

We extracted data for this study from Psychiatry Sweden, a longitudinal database of Swedish national registers, linked using unique personal identification numbers (EPiCSS, 2023). These registers provide a range of data, including: date of birth and sex (Register of the Total Population [RTB]); migration status (Immigration and Emigration Database [STATIV]; the Multi-generation Register); education and disposable income (Longitudinal Integration Database for Health Insurance; Labour Market Studies [LISA]); clinical diagnosis (National Patient Registry [NPR]); and mortality information (Cause of Death Register) (Duggal et al., 2020; Hollander et al., 2016).

2.2. Study design and population

We identified a retrospective cohort of 1,328,221 people, born between 1 January 1984, and 31 December 1997. Participants were either Swedish-born to two Swedish-born parents, refugee migrants born outside of Sweden, or non-refugee migrants born outside of Sweden. To increase the validity of comparisons between refugees and non-refugee migrants, we only included migrants born in geographical regions where at least 1000 refugees were also included in the cohort (Hollander et al., 2016). People born in Sweden to one or more parents born outside of Sweden (i.e. children of migrants) were excluded from the study, as they are distinct in that they had not immigrated themselves. Asylum seekers, undocumented migrants and temporary visitors were also excluded, as Swedish registers only include data on people with permanent residential status who are assigned a personal identity number (Careja and Bevelander, 2018). All participants were followed from their 14th birthday, or from the date they immigrated to Sweden, if later, until 31 December 2016, or earlier exit from the cohort due to death, emigration, or receipt of a diagnosis of interest, whichever came first.

2.3. Exposures

Our primary exposure was refugee status, classified as (1) refugee migrants, (2) non-refugee migrants or (3) Swedish-born to two Swedish born parents (henceforth "Swedish-born"). As a secondary exposure, region-of-origin was classified into five groups: (1) Swedish-born, (2) Asia and Oceania, (3) Middle East and North Africa, (4) Russia and Eastern Europe, (5) sub-Saharan Africa.

2.4. Outcomes

We identified all participants with a first recorded diagnosis of affective psychotic disorder [APD] or non-psychotic bipolar disorder [NPB] in the NPR, according to the International Classification of Diseases, 10th revision [ICD-10]. Our APD outcome included bipolar or mania with psychotic features (F30.2, F31.2, F31.5), psychotic depression (F32.3, F33.3); NPB included all diagnoses of mania or bipolar disorder without psychotic features (F30 and F31 codes with any suffix, except those listed for APDs). Participants who had ever been diagnosed with a non-affective psychotic disorder (F20–29), or diagnosed with APD or NPB prior to their 14th birthday were excluded from the study. For case participants, we used date of first diagnosis of any outcome as date of exit from the cohort.

2.5. Confounders

We included sex and age, as well as the interaction between them as a priori confounders. We categorized age into six groups (14–16; 17–19; 20–22; 23–25; 26–28; 29–32). We considered income as a possible confounder, as lower socioeconomic status has been shown to be associated with both refugee status (Lukasiewicz, 2017; Taylor, 2004) and psychotic disorders (Kivimäki et al., 2020). However, as income may be on the causal pathway between refugee status and our outcomes, we included adjustment for it in a sensitivity analysis. We used family disposable income quartile at cohort entry, estimated from the LISA database (calculated by total income from all sources minus taxes, weighted for family size and age of children) as a proxy for SES (Dalén et al., 2015).

2.6. Statistical analysis

To determine whether we could conduct a complete case analysis, we inspected the level of missingness in the dataset and whether this differed by exposure status using univariable tests. Next we estimated descriptive statistics for the complete case sample by refugee status.

We examined the effect of refugee status on each outcome by estimating unadjusted and adjusted hazard ratios [HR] and 95 % confidence intervals [95%CI], using the Swedish-born group as the reference category. We also estimated whether rates of APDs and NPB differed in refugees compared with non-refugee migrants by reparameterizing models with the latter set as the reference category. In a sensitivity analysis, we additionally adjusted for family disposable income quartile. Finally, we repeated these analyses in stratified models, restricted to Swedish-born participants and a single region-of-origin group. We were unable to formally test directly for effect modification of the association between refugee status and our outcomes by region-of-origin because of collinearity between these two exposure variables (i.e. the reference category for each was the Swedish-born group). All analyses were conducted using Stata v.17.

2.7. Ethical approval

This study was approved by the Stockholm Regional Ethical Review Board (2010/1185–31/5) and the UCL Research Ethics Committee (21,019/001), and consent was waived.

3. Results

3.1. Sample characteristics

We included 1,328,221 participants who were followed for a total of 15.1 m person-years. During this period 2428 participants were diagnosed for the first time with an affective psychotic disorder (crude incidence rate: 16.0 per 100,000 person-years; 95 % CI: 15.4–16.7) and 9625 were diagnosed for the first time with non-psychotic bipolar

disorder (crude incidence rate: 63.8 per 100,000 person-years; 95 % CI 62.6–65.1) . The proportion of APD and NPB cases and crude incidence rates differed by refugee status, but in different directions (Table 1). For example, crude rates of APD were higher in refugees than non-refugees and the Swedish-born population (e.g. incidence$_{refugee}$: 30.5; 95 % CI: 23.5–39.5 vs. incidence$_{Swedish-born}$: 14.5; 95 % CI: 14.8–16.1), but for NPB crude rates were lower for refugees and non-refugees than the Swedish-born population (e.g. incidence$_{Swedish-born}$: 68.0; 95 % CI 66.6–69.4 vs. incidence$_{refugee}$: 11.2; 95 % CI: 7.3–17.2). Median age-at-first-diagnosis was older in refugee (23.9 years; interquartile range [IQR]: 21.4–27.5) and non-refugee migrants (24.3 years; IQR: 20.8–27.2) than Swedish-born cases (21.5 years; IQR: 18.6–24.8; Kruskal-Wallis test *p*-value: <0.001). These patterns were mirrored by later age at cohort entry for refugee (17.4; IQR: 14.0–21.6) and non-refugee migrants (18.0; IQR: 14.0–22.6) than Swedish-born participants (14.0; IQR: 14.0–14.0; Kruskal-Wallis p-value: <0.001; Table 1).

All sociodemographic variables differed by refugee status (Table 1; all *p* < 0.001), with a higher proportion of non-refugee and refugee migrants in the oldest age group (29–32 years old) at cohort exit, and in the lowest family income quartile, compared with Swedish-born participants. A higher proportion of refugees were men compared with both the non-refugee migrant or Swedish-born populations (57.5 % vs. 49.3 % and 51.3 %, respectively; Table 1). Refugees predominantly originated from the Middle East or North Africa (37.6 %) or sub-Saharan Africa (36.8 %). Non-refugee migrants predominantly originated from the Middle East or North Africa (32.8 %), or Russia or Eastern Europe (29.1 %). The smallest proportion of non-refugee migrants originated from sub-Saharan Africa (11.5 %).

3.2. Rates of APD by refugee status

Rates of APDs were elevated in refugee and non-refugee migrants, compared with the Swedish-born population in unadjusted and adjusted models (Table 2). After adjustment for age, sex and their interaction, the rate of APD was 2.07 times higher in refugees (95 % CI: 1.55–2.78), and 1.40 times higher in non-refugees (95 % CI: 1.16–1.68) than in the Swedish-born population. This corresponded to a 1.48 times higher rate in refugees compared with non-refugee migrants (95 % CI: 1.11–1.99). The elevated hazard ratios in refugee and non-refugee migrants were attenuated in a sensitivity analysis following further adjustment for family disposable income; rates of APDs in non-refugees migrants were no longer different to rates in the Swedish-born population (HR: 1.02; 0.85–1.24), although there was evidence that rates remained elevated in refugees (HR: 1.49; 95 % CI: 1.10–2.01).

3.3. Rates of APD by refugee status and region-of-origin

In unadjusted models stratified by region-of-origin, elevated rates of APD were observed for refugee and non-refugee migrants from Asia or Oceania, the Middle East and North Africa, and sub-Saharan Africa, compared with the Swedish-born population (Table 3), but no differences for refugee or non-refugee migrants from Russia or Eastern Europe. After adjustment for age, sex and their interaction, elevated rates persisted for refugees (HR: 2.13; 95 % CI: 1.16–3.90) and non-refugee migrants (HR: 2.40; 95 % CI: 1.67–3.44) from sub-Saharan Africa, compared with the Swedish-born population, though there was no evidence these rates differed from each other (HR: 0.89; 95 % CI: 0.50–1.58). By contrast, while adjusted rates remained elevated for both

Table 1
Sample characteristics by refugee status.

	Swedish-born population	Non-refugee migrants	Refugees	Statistics	
	n (%)[a]	n (%)[a]	n (%)[a]	χ² (df)	p-Value
Total	1,171,811 (88.22)	132,537 (9.98)	23,873 (1.80)		
Affective psychotic disorder				6.4 (2)	0.04
Yes	2152 (0.18)	219 (0.17)	57 (0.24)		
No	1,169,659 (99.82)	132,318 (99.83)	23,816 (99.76)		
Incidence rate (per 100,000 p-y) (95 % CI)	16.0 (15.4–16.9)	21.2 (18.6–24.3)	30.5 (23.5–39.5)		
Non-psychotic bipolar disorder				37.9 (2)	<0.001
Yes	9625 (0.82)	178 (0.13)	21 (0.09)		
No	1,160,233 (99.18)	132,140 (99.87)	23,795 (99.9)		
Incidence rate (per 100,000 p-y) (95 % CI)	63.8 (62.6–65.1)	17.3 (14.9–20.0)	11.2 (7.3–17.2)		
Region of origin				1,440,951.8 (8)	<0.001
Sweden	1,171,812 (100.00)	–	–		
Asia or Oceania	–	35,140 (26.51)	4851 (20.32)		
Middle East or North Africa	–	43,511 (32.83)	8973 (37.59)		
Russian or Eastern Europe	–	38,587 (29.11)	1276 (5.34)		
Sub-Saharan Africa	–	15,299 (11.54)	8773 (36.75)		
Sex				562.9 (2)	<0.001
Male	600,763 (51.27)	65,390 (49.34)	13,722 (57.48)		
Female	571,049 (48.73)	67,147 (50.66)	10,151 (42.52)		
Age at exit (years)[c]				10,567.0 (10)	<0.001
14–16	2969 (0.25)	1987 (1.50)	157 (0.66)		
17–19	75,702 (6.46)	8561 (6.46)	1351 (5.66)		
20–22	247,022 (21.08)	22,319 (16.84)	4982 (20.87)		
23–25	284,041 (24.24)	25,689 (19.38)	5176 (21.68)		
26–28	267,181 (22.80)	29,499 (22.26)	4979 (20.86)		
29–32	294,897 (25.17)	44,482 (33.56)	7228 (30.28)		
Median age-at-first-diagnosis (IQR)	21.5 (18.6–24.8)	24.3 (20.8–27.2)	23.9 (21.4–27.5)	58.1 (2)[b]	<0.001[b]
Median age-at-cohort-entry (IQR)	14.0 (14.0–14.0)	18.0 (14.0–22.6)	17.4 (14.0–21.6)	200,490.1 (2)[b]	<0.001[b]
Income				322,195.4 (6)	<0.001
Quartile 1 (lowest)	243,351 (20.77)	118,119 (89.12)	22,423 (93.93)		
Quartile 2	280,926 (23.97)	9211 (6.95)	1080 (4.52)		
Quartile 3	317,900 (27.13)	3278 (2.47)	272 (1.14)		
Quartile 4 (highest)	329,635 (28.13)	1929 (1.46)	98 (0.41)		

χ²: Chi-squared; df: degrees of freedom; p-y: person-years; 95 % CI: 95 % confidence interval.

[a] Column percentages except for first row (row percentages).

[b] Kruskal-Wallis.

[c] Used for sample characteristics only; age group was treated as a time-varying covariate in modelling, using the same groups.

Table 2

Unadjusted and adjusted hazard ratios for affective psychotic disorders and non-psychotic bipolar disorder by refugee status.

Outcome by group	Unadjusted	Adjusted[a]	Sensitivity[b]
	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)
Affective psychotic disorders			
Swedish-born as reference			
Refugees	2.33 (1.79 to 3.04)	2.07 (1.55 to 2.78)	1.49 (1.10 to 2.01)
Non-refugee migrants	1.59 (1.38 to 1.83)	1.40 (1.16 to 1.68)	1.02 (0.85 to 1.24)
Non-refugee migrants as reference			
Refugees	1.47 (1.10 to 1.96)	1.48 (1.11 to 1.99)	1.45 (1.09 to 1.95)
Non-psychotic bipolar disorder			
Swedish-born as reference			
Refugees	0.23 (0.15 to 0.36)	0.24 (0.16 to 0.38)	0.18 (0.11 to 0.28)
Non-refugee migrants	0.34 (0.29 to 0.40)	0.34 (0.28 to 0.41)	0.25 (0.20 to 0.30)
Non-refugee migrants as reference			
Refugees	0.69 (0.44 to 1.08)	0.73 (0.46 to 1.15)	0.71 (0.45 to 1.12)

HR: hazard ratio; 95 % CI: 95 % confidence interval.

[a] Adjusted for age group as a time-varying covariate, sex, interaction between age group and sex.

[b] Additional adjustment for family disposable income quartile at cohort entry.

refugee (HR: 3.75; 95 % CI: 2.18–6.45) and non-refugee migrants (HR: 1.52; 95 % CI: 1.03–2.26) from Asia or Oceania relative to the Swedish-born population, these were elevated in refugees compared with non-refugee migrants (HR: 2.46; 95 % CI: 1.35–4.47). No other differences were observed after adjustment for age and sex. Further adjustment for disposable family income attenuated these findings in a sensitivity analysis, though elevated rates remained for refugee migrants from Asia and Oceania (HR: 2.65; 95 % CI: 1.53–4.57) and for non-refugee migrants from sub-Saharan African (HR: 1.74; 95 % CI: 1.21–2.50), relative to the Swedish-born population (Table 3).

3.4. Rates of NPB by refugee status

In contrast with APDs, rates of NPB were reduced in refugees and non-refugee migrants compared with the Swedish-born population in unadjusted and adjusted models (Table 3). For example, in adjusted models, NPB rates for refugees (HR: 0.24; 95 % CI: 0.16–0.38) and non-refugees (HR: 0.34; 95 % CI: 0.28–0.41) were substantially lower than in the Swedish-born population, with no difference between the two groups (i.e. refugee vs. non-migrant refugees: HR: 0.73; 95 % CI: 0.46–1.15).

3.5. Rates of NPB by refugee status and region-of-origin

Rates of NPB were reduced in refugees and non-refugee migrants from all regions of origin compared with the Swedish-born group, in both unadjusted and adjusted models (Table 4). Effect sizes were similar to those reported for our unstratified analyses above, and we found no evidence that rates of NPB differed between refugees and non-refugee migrants from any region of origin.

4. Discussion

4.1. Principal findings

We found that rates of affective psychotic disorders were approximately twice as high in refugees compared the Swedish-born majority population, and almost 50 % higher than in non-refugee migrants from similar regions-of-origin. After accounting for differences in baseline income levels, these rates remained almost 50 % higher in refugees than in either non-refugee migrants or the Swedish-born population. Further inspection of these patterns suggested that they were predominantly driven by elevated rates in both refugee and non-refugee migrants from Asia and Oceania, and sub-Saharan Africa. To our knowledge, this is the first study that investigates the incidence of APDs in refugees, compared with non-refugee migrants and a native-born comparison population. By contrast, refugee and non-refugee migrants from all regions of origin, had consistently and substantially lower rates of non-psychotic bipolar disorders, consistent with earlier work considering this group as a whole (Dykxhoorn et al., 2019b).

4.2. Comparison with previous literature

To date, no other study has investigated whether the incidence of APDs is higher in refugees compared with other migrants or the host population. Instead, previous studies have taken one of five approaches: (1) combined findings for both NAPDs and APDs under the umbrella term 'psychosis' (e.g. Kroll et al., 2011) or 'psychotic illness' (e.g. Fazel et al., 2005); (2) combined findings for APDs and affective disorders without psychosis (e.g. bipolar with and without psychotic features)

Table 3

Unadjusted and adjusted hazard ratios for affective psychotic disorders by refugee status and region-of-origin.

Region-of-origin	Swedish-born as reference category			Non-migrants as reference category		
	Unadjusted	Adjusted[a]	Sensitivity[b]	Unadjusted	Adjusted[a]	Sensitivity[b]
	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)
Asia or Oceania						
Refugees	3.19 (1.92 to 5.31)	3.75 (2.18 to 6.45)	2.65 (1.53 to 4.57)	2.45 (1.36 to 4.44)	2.46 (1.35 to 4.47)	2.30 (1.27 to 4.19)
Non-refugee migrants	1.30 (0.95 to 1.77)	1.52 (1.03 to 2.26)	1.15 (0.77 to 1.71)	1	1	1
Middle East or North Africa						
Refugees	1.89 (1.22 to 2.95)	1.35 (0.83 to 2.20)	0.97 (0.59 to 1.58)	1.15 (0.70 to 1.87)	1.18 (0.72 to 1.92)	1.17 (0.72 to 1.91)
Non-refugee migrants	1.65 (1.32 to 2.05)	1.15 (0.84 to 1.56)	0.82 (0.60 to 1.12)	1	1	1
Russia or Eastern Europe						
Refugees	1.68 (0.54 to 5.22)	1.64 (0.52 to 5.11)	1.24 (0.40 to 3.82)	1.32 (0.41 to 4.25)	1.31 (0.40 to 4.25)	1.28 (0.39 to 4.14)
Non-refugee migrants	1.27 (0.96 to 1.68)	1.25 (0.85 to 1.83)	0.97 (0.66 to 1.43)	1	1	1
Sub-Saharan Africa						
Refugees	2.52 (1.60 to 3.97)	2.13 (1.16 to 3.90)	1.54 (0.84 to 2.81)	0.94 (0.55 to 1.61)	0.89 (0.50 to 1.58)	0.89 (0.50 to 1.57)
Non-refugee migrants	2.67 (1.99 to 3.59)	2.40 (1.67 to 3.44)	1.74 (1.21 to 2.50)	1	1	1

HR: hazard ratio; 95 % CI: 95 % confidence interval.

[a] Adjusted for age group as a time-varying covariate, sex, interaction between age group and sex.

[b] Additional adjustment for family disposable income quartile at cohort entry.

Table 4
Unadjusted and adjusted hazard ratios for non-psychotic bipolar disorder by refugee status and region-of-origin.

Region-of-origin	Swedish-born as reference category			Non-migrants as reference category		
	Unadjusted	Adjusted[a]	Sensitivity[b]	Unadjusted	Adjusted[a]	Sensitivity[b]
	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)	HR (95 % CI)
Asia or Oceania						
Refugees	0.24 (0.09 to 0.64)	0.23 (0.08 to 0.64)	0.17 (0.06 to 0.47)	0.88 (0.31 to 2.48)	1.04 (0.37 to 2.96)	0.97 (0.34 to 2.76)
Non-refugee migrants	0.27 (0.19 to 0.39)	0.22 (0.14 to 0.36)	0.18 (0.11 to 0.28)	1	1	1
Middle East or North Africa						
Refugees	0.32 (0.19 to 0.56)	0.33 (0.19 to 0.59)	0.24 (0.13 to 0.42)	0.95 (0.53 to 1.73)	1.03 (0.57 to 1.87)	1.03 (0.57 to 1.86)
Non-refugee migrants	0.34 (0.27 to 0.43)	0.32 (0.24 to 0.43)	0.23 (0.17 to 0.31)	1	1	1
Russia or Eastern Europe						
Refugees	0.14 (0.02 to 0.97)	0.13 (0.02 to 0.93)	0.10 (0.01 to 0.70)	0.30 (0.04 to 2.13)	0.31 (0.04 to 2.26)	0.30 (0.04 to 2.18)
Non-refugee migrants	0.46 (0.37 to 0.59)	0.42 (0.30 to 0.58)	0.33 (0.24 to 0.45)	1	1	1
Sub-Saharan Africa						
Refugees	0.12 (0.04 to 0.37)	0.08 (0.02 to 0.28)	0.06 (0.02 to 0.23)	0.64 (0.18 to 2.25)	0.51 (0.14 to 1.87)	0.55 (0.15 to 2.02)
Non-refugee migrants	0.19 (0.11 to 0.33)	0.15 (0.08 to 0.30)	0.12 (0.06 to 0.22)	1	1	1

HR: hazard ratio; 95 % CI: 95 % confidence interval.
[a] Adjusted for age group as a time-varying covariate, sex, interaction between age group and sex.
[b] Additional adjustment for family disposable income quartile at cohort entry.

under an inclusive term such as 'affective disorders' (e.g. Norredam et al., 2009) or 'depressive disorders'/'depression' (e.g. Björkenstam et al., 2022; Sundquist et al., 2004); (3) distinguished NAPDs from APDs, but grouped refugees and non-refugee migrants together (e.g. Dykxhoorn et al., 2019b; O'Donoghue et al., 2021; Selten et al., 2020); (4) investigated the prevalence, but not incidence, of affective psychotic disorders (e.g. Dube and Kumar, 1973; Fazel et al., 2005), or; (5) used an ecological proxy for refugee status (O'Donoghue et al., 2021; Sundquist et al., 2004). For example, O'Donoghue et al. (2021) investigated rates of NAPDs and APDs in migrants from regions that refugees to Australia were most likely to originate (e.g., Ethiopia, Somalia and Afghanistan); in this study migrants from countries that also had the highest proportion of refugees in Australia, also had the highest risk of both sets of psychotic disorders.

Several other studies have found that refugees are at increased risk of non-affective psychotic disorders (Brandt et al., 2019; Hollander et al., 2016), with the hypothesised mechanisms arising through exposure to trauma experienced prior to or during migration. Given bipolar and other affective disorders have also been associated with exposure to traumatic life events (e.g. parental loss - Marangoni et al., 2016; adverse childhood experiences - Felitti et al., 1998), our findings are congruent with the hypothesis that exposure to trauma is a non-specific contributory factor for elevated rates of various psychiatric disorders, including APDs, in refugee groups (and potentially other migrants). Swedish epidemiological studies of post-traumatic stress disorder [PTSD] underline this (Rahman et al., 2022).

Our findings are also consistent with previous studies that have observed higher rates of APDs in migrants generally, but lower rates of NPBs (Dykxhoorn et al., 2019b; O'Donoghue et al., 2021). These studies observed that APDs are most elevated amongst migrants from sub-Saharan Africa, while migrants from other European countries do not show elevated rates compared with the majority population. We found no differences in the elevated rates of APDs between refugees and non-refugee migrants from sub-Saharan Africa, consistent with our previous research on non-affective psychotic disorders in this population (Hollander et al., 2016). This was in contrast to higher rates of APDs in refugees from Asia or Oceania compared with their non-refugee counterparts. As we proposed previously, one possibility here is that, on average, refugees and other migrants from sub-Saharan Africa share more similar exposure profiles to social determinants of mental health that occur before, during and after migration than do refugee and non-refugee migrants from other settings. Examples of such exposures include "political disturbances in the home country, exposures to war or political violence, gender-based discrimination, and extreme poverty" (Corley and Sabri, 2021).

Previous research has presented contrasting findings for the risk of APDs in migrants from the 'Asia or Oceania' region (Dykxhoorn et al., 2019b; O'Donoghue et al., 2021; Selten et al., 2020). In a similar population sample to the present study, we have previously reported that rates of APDs in all migrants to Sweden from 'Asia or Oceania' are elevated compared with the Swedish-born population (HR: 1.53; 95 % CI: 1.18–1.99; Dykxhoorn et al., 2019b). In contrast, O'Donoghue et al. (2021) found that migrants to Australia from South-East Asia had lower rates of APDs than the Australian-born population (adjusted incidence rate ratio: 0.49; 95 % CI: 0.24–0.97), with no statistically significant differences observed for other Asian migrants. Various factors may explain these differences, including the specific migrant flows in different contexts. In Sweden, for example, the majority of migrants from 'Asia or Oceania' originated from Central Asia, particularly Afghanistan, which have experienced considerable conflict, sociocultural and political instability in the last half century. Such factors may contribute to higher rates of APDs observed in migrants from these countries (most notably for refugees in the present study), in contrast to lower rates experienced by migrants from other parts of Asia. In further contrast, Anderson et al. (2015) have observed lower rates of any psychotic disorder in migrants from East Asia to Canada, but elevated rates amongst South Asian migrants. Future studies need to investigate how specific cultural and social processes may influence mental health risks for migrants, including refugees, emigrating to different contextual environments. More attention is required to understand how intersectionalities of race, culture, religion, socioeconomic position, trauma and social contexts shape differential risk of serious mental illness in specific groups.

4.3. Strengths and limitations

Our study used nation-wide longitudinal register linkage data, which allowed us to explore the links between APD in refugees, which has not been previously conducted. Swedish linked registers are known to be reliable for research in mental health, and specifically for psychotic disorders (Björkenstam et al., 2022; Duggal et al., 2020; Hollander et al., 2016). A further strength of our study was complete data on the population at-risk throughout the follow-up period.

There are several limitations of this study that must be considered. A primary concern is that, unlike schizophrenia (Dalman et al., 2002) or PTSD (Hollander et al., 2019), diagnoses of bipolar disorder and psychotic depression in the NPR have yet to be validated. Our findings are thus predicated on the assumption that clinical diagnoses were valid across all groups by refugee status and by region-of-origin. Although we cannot test this assumption, we excluded any participant with a

diagnosis of non-affective psychotic disorder in the NPR to minimize possible misclassification. While patterns of higher rates of psychotic disorders, but lower rates of non-psychotic bipolar disorder could indicate some specificity of migrant risk to psychotic rather than affective symptoms, these patterns may also arise if normative cultural traits or behaviors in migrant groups are misinterpreted as psychotic phenomena during clinical assessment; language barriers may increase the likelihood of this possibility. Such misdiagnosis would have led to an over-ascertainment of cases in our migrant samples, resulting in over-estimation of effect sizes for APDs amongst refugee and non-refugee migrants, and underestimation of NPBs.

A second concern, which would act in the opposite direction, arises in differential case detection by refugee status. Specifically, although Sweden has a publicly-funded universal health care system, where all with a residence permit are offered necessary health care on the same terms, migrants use psychiatric care less than the Swedish-born population (Hollander et al., 2020). Additionally, as a result of language barriers and cultural differences (Gondek and Kirkbride, 2018; Lindert et al., 2008), migrants may have different help-seeking behaviors. Consequently, a higher proportion of refugee and non-refugee migrants may have not presented to formal healthcare services, thus conservatively biasing our findings.

Third, we could only include data until the end of 2016. Since then, we have continued to observe ongoing and new refugee crises in various parts of the world, including Syria, Afghanistan and Ukraine. Our findings do not capture the effects of these recent and ongoing geopolitical issues, though if causal, would suggest the impact of these events would lead a greater proportion of people to be affected by serious mental illness. Fourth, despite our large sample size, we often had small numbers of cases in specific strata when stratifying by refugee status and region-of-origin, reducing our power to detect variation in rates. Finally, our sensitivity analysis suggested that adjustment for income substantially attenuated risk by refugee status. While this may be an important causal component of risk amongst refugees and other migrants, who were predominantly in the lowest income quartile at cohort entry, income may be on the causal pathway between refugee status and APD making adjustment inappropriate.

4.4. Implications and future research

Our findings add to the previous literature to show that refugees are at increased risk of several severe mental illnesses [SMIs], including non-affective psychotic disorders and PTSD, compared with both non-refugee migrants from similar regions-of-origin and the general population (Brandt et al., 2019; Fazel et al., 2005). Together these findings demonstrate that factors associated with refugee status likely act in a non-specific way to increase risk for several psychiatric disorders. More research is required to tease out these effects.

Results from our sensitivity analysis highlight the potential importance of socioeconomic position as a vital determinant of future risk of SMI amongst refugees and other migrants. While we were cautious to adjust for family disposable income in a sensitivity analysis, it is plausible that socioeconomic positions are on the causal pathway between refugee status and SMI. Most refugees and many migrants experience severe socioeconomic disadvantage prior to and after arrival in Sweden. In our study over 90 % of refugees and 80 % of non-refugee migrants were in the lowest quintile of family disposable income at cohort entry. Therefore, these findings suggest that post-migration interventions, such as access to adequate income after immigration, may provide opportunities to ameliorate adverse mental health outcomes in these high risk groups.

Further, a recent quasi-experimental study amongst refugees in Denmark has also demonstrated that those who were resettled by the Danish government into more disadvantaged neighborhoods had greater subsequent risk of being diagnosed with a psychiatric disorder (Foverskov et al., 2022), though this was most evident for the class of neurotic

and stress-related disorders which included PTSD. Refugees and non-refugee migrants living in disadvantaged neighborhoods may experience differential access to labor markets, lower levels of welfare support, or reduced access to high-quality health and social care compared to those living in more advantaged neighborhoods. There may be opportunities to use further natural experiments to establish causal effects of intervening on socioeconomic determinants of mental health in these groups. This would then pave the way for selected primary intervention strategies to be implemented to reduce refugee and migrant disparities in SMI.

Previous research has also shown that pre, peri- and post-migratory adversities are often more traumatic for refugees than for non-refugee migrants (Brandt et al., 2019; Dapunt et al., 2017; Finklestein and Solomon, 2009), which may explain why we found that refugees had a higher likelihood of receiving an APD diagnosis. One likely important set of determinants here are traumatic experiences that contributed to the need to seek asylum, including those encountered before and during this process. Timely access to culturally-appropriate psychosocial interventions as an indicated prevention strategy for high-risk traumatized individuals may also help prevent refugee and migrant inequalities in SMI. Given evidence that migrant groups are less likely to access psychiatric support than the Swedish-born population (Dykxhoorn et al., 2020), it is essential to improve access to care for refugees especially, and to adapt interventions for this population. We have also previously shown that social support during and after migration can ameliorate risk of psychotic disorders amongst migrants (Dykxhoorn et al., 2020, 2019a). This includes immediate social support offered by first degree relatives (though the effects appear sex-specific; Dykxhoorn et al., 2019a), and protective effects of greater own-group migrant density in the neighborhood (Dykxhoorn et al., 2020).

While this study sheds light on some of the mental health problems that refugees face when settled in a high-income country, further research is needed to understand the wide range of mental health problems that refugees settled in low and middle income countries [LMICs] may face, as the majority are settled in these countries. Worldwide, 76 % of refugees are resettled in LMICs (UNCHR, 2022a), and it is possible that our findings do not generalize to these group, who may differ from those settled in high-income countries in various ways, including exposure to ongoing socioeconomic disadvantage and social stressors for people living in resettlement camps or other precarious environments (Duggal et al., 2020).

Evidence suggests that the prevalence of common mental disorders and psychological distress amongst refugees in resettlement camps is high (Blackmore et al., 2020; Henkelmann et al., 2020), but estimates of the burden of SMIs, including psychotic disorders, remain sparse. One small survey of Palestinian refugees encamped in Lebanon reported the lifetime prevalence of psychotic disorders was 3.3 % (Llosa et al., 2014), a figure consistent with lifetime prevalence estimates in general population samples from the Global North (Perälä et al., 2007). Another recent study, drawing on UNHCR data, reported that utilization rates for mental healthcare in 175 refugee camps across 24 LMICs were higher for psychotic disorders than most other forms of mental distress (Fine et al., 2022). Our findings, together with these gaps in the literature, underline the importance of quantifying and tackling the level of underlining psychosis morbidity that further exacerbate mental health inequalities experience by refugee migrants.

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Lilian Burr: Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Jennifer Dykxhoorn:** Data curation, Methodology, Supervision, Writing – review & editing. **Anna-Clara Hollander:** Data curation, Project administration, Writing – review & editing. **Christina Dalman:** Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Writing – review & editing. **James B. Kirkbride:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing.

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2024.02.043.

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