Citation for published version (APA):
Neighbourhood ethnic density and psychosis — Is there a difference according to generation?

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ARTICLE INFO

Article history:
Received 9 June 2017
Received in revised form 19 September 2017
Accepted 21 September 2017
Available online xxxx

Keywords:
Aetiology
Social determinants
Ethnicity

ABSTRACT

Background: For different migrant groups living in an area with few people from the same ethnic background is associated with increased psychosis incidence (the ethnic density effect). We set out to answer the question: are there generational differences in this effect?

Methods: Analysis of a population based cohort (2.2 million) comprising all those born 1st January 1965, or later, living in Denmark on their 15th birthday. This included 90,476 migrants from Africa, Europe (excluding Scandinavia) and the Middle East, with 55% first generation and the rest second-generation migrants. Neighbourhood co-ethnic density was determined at age 15 and we adjusted for age, gender, calendar period, parental psychiatric history and parental income.

Results: For first-generation migrants from Africa, there was no statistically significant difference (p = 0.30) in psychosis rates when comparing lowest with highest ethnic density quintiles, whereas the second generation showed a 3.87-fold (95% CI 1.77–8.48) increase. Similarly, for migrants from the Middle East, the first generation showed no evidence of an ethnic density effect (p = 0.94) while the second showed a clear increase in psychosis when comparing lowest with highest quintiles, incidence rate ratio (IRR) 2.43 (95% CI, 1.18–5.00). For European migrants, there was some limited evidence of an effect in the first generation, (IRR) 1.69 (95% CI, 1.19–2.40), with this slightly raised in the second: IRR 1.80 (95% CI, 1.27–2.56).

Conclusions: We found strong evidence for an ethnic density effect on psychosis incidence for second-generation migrants but this was either weak or absent for the first generation.

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1. Introduction

Migrant groups are consistently shown to have an increased risk of psychotic illness which persists from one generation to the next (Bourque et al., 2011; Cantor-Graae and Pedersen, 2013; Cantor-Graae and Selten, 2005). In recent years, therefore, much research attention has been paid to the post-migration social environment, and it has been repeatedly shown that living in a low ‘ethnic density’ area (with few people from the corresponding ethnic group) is associated with increased psychosis incidence (Boydell et al., 2001; Kirkbride et al., 2007a; Schofield et al., 2011a, b; Veling et al., 2008). However, it is not known how this might contribute to the increased risk persisting from one generation to the next.

The ethnic density effect has been linked to both the process of acculturation, the meeting of migrant and host cultures and the consequent psychological stress, and also the experience of discrimination (Becares et al., 2009; Halpern and Nazroo, 2000; Jurcik et al., 2013; Shaw et al., 2012). Both factors, it is argued, could be more salient for the second generation (Mahy et al., 1999; McIntyre et al., 2016; Nakash et al., 2012; Smith et al., 2009; Williams et al., 2007). Studies of generational differences have an important role to play generally in helping us understand the increased risk of psychosis among migrant groups (Bourque et al., 2011). Therefore, investigating generational
differences in the effect of neighbourhood ethnic density could help further our understanding of processes behind this, as yet, little understood risk factor for psychosis.

However, to date no studies have addressed this question. This is perhaps not surprising given the inherent sample size problems when investigating members of minority ethnic groups in areas where their ethnic group is under-represented. A further problem is differential exposure where the exposure period is likely shorter for the first generation compared to those born in the host country. One solution would be to use a whole population cohort design ensuring the first generation has a minimum exposure period.

This is the first nationwide population based study that sets out to disentangle the effect of ethnic density between first and second generation migrants. We could achieve this using whole population cohort data covering migrants to Denmark for a period of up to thirty years or more, linked to information about their neighbourhood at age 15. In this way, we set out to answer the question: are there generational differences in the association between ethnic density at age 15 and later incidence of non-affective psychosis?"
We also allowed for over-dispersion using negative binomial regression. This made no difference to the main study results and therefore only the Poisson model results are presented here. All analyses were conducted using Stata version 14 (StataCorp, 2015).

2.4. Sensitivity analysis

To account for between generation differences in duration of neighbourhood exposure we repeated the analysis for the first generation but restricting the cohort to those living in Denmark for at least 7 years. We chose this time-period to maximise exposure time while retaining a sample comparable in size to the second generation. Also, to ensure that our results overall were invariant to the way we chose to define ethnic density we re-ran the analysis using a continuous ethnic density measure and compared this with the main analysis using ethnic density quintiles.

2.5. Ethical approval

The study was approved by the Danish Data Protection Agency.

3. Results

3.1. Sample

We followed 2,195,684 Danish citizens over 31,525,426 person years. This included 49,606 first generation migrants, from the defined regions, and 40,870 of the second generation. Of these, 1,230 first generation and 592 second generation migrants were diagnosed with a non-affective psychosis during follow-up. Incidence was raised in the first generation compared with the second for each group (see Table 1). In comparison the crude psychosis incidence rate for native Danes was 7.2 (95% CI 7.1–7.3) cases per 10,000 person years.

3.2. Ethnic density associations compared across generations

The association between neighbourhood ethnic density and later psychosis incidence was clear for second generation migrants in our study and either absent, or reduced, for the first generation (Table 2). For the first-generation African group, there was no statistically significant difference in psychosis rates (p = 0.30), when comparing the lowest with the highest ethnic density quintiles, whereas for the second generation there was a 3.87-fold (95% CI 1.77–8.48) increased incidence. Similarly, for the Middle East group there was no statistically significant difference (p = 0.94) for the first generation while the second generation showed a clear increase in psychosis rates, incidence rate ratio (IRR) 2.43 (95% CI, 1.18–5.00), when comparing lowest and highest quintiles. For the group from Europe (non-Scandinavian) there was some evidence of an ethnic density effect in both the first generation, (IRR) 1.69 (95% CI, 1.19–2.40), comparing lowest and highest quintiles, and the second generation: IRR 1.13 (95% CI, 1.05–1.22). We also looked at the overall linear trend (Table 2), in terms of the average increase in incidence associated with a one quintile increase in ethnic density. For the first generation, European group this showed no statistically significant difference, (IRR) 1.06 (95% CI, 0.99 to 1.14, p = 0.12), and a linear trend was only apparent among the second generation, (IRR) 1.13 (95% CI, 1.05 to 1.22). The same pattern emerged for the other groups, with the African group showing a weak, non-statistically significant (p = 0.18), trend for the first generation, (IRR) 1.09 (95% CI, 0.96 to 1.23), in contrast to a clear linear trend for the second generation, (IRR) 1.43 (95% CI, 1.19 to 1.72). For the Middle East group, there was, again, no evidence of a linear trend for the first generation, (IRR) 0.98 (95% CI, 0.91 to 1.06, p = 0.66), in contrast to the second, (IRR) 1.24 (95% CI, 1.07 to 1.44).

We also re-analysed the data restricting first generation migrants to those who had been living in Denmark for at least 7 years prior to their 15th birthday. This made little difference to the main analysis results (Appendix Table 3) other than to further accentuate the between generation differences that we have already described. Also, when we re-ran the main analysis using a continuous measure of ethnic density a very similar pattern emerged as with the quintiles based analysis (Appendix Table 4).

Lastly, these results describe relative differences within each of the migrant groups we looked at. We also present the same results but this time comparing each group with native Danes. Here the reference group is native Danes in the least ethnically dense quintile. (Appendix Table 5). Here it is apparent that any increased risk of psychosis among migrants is no longer statistically significant for the second generation living in high ethnic density areas, and for the Middle East group there is actually a lower than average risk, (IRR) 0.58 (95% CI, 0.37–0.91). Conversely, first generation African and Middle Eastern migrants in high ethnic density areas continue to be at an increased risk of psychosis.

4. Discussion

4.1. Summary of the results

We found that associations between neighbourhood ethnic density and later non-affective psychosis were largely confined to second generation migrants. This was most apparent for those originating from Africa and the Middle East. Among the first generation, only the group originating from Europe showed evidence of any ethnic density effect (although even here the overall trend was not statistically significant).

4.2. Strengths and limitations

This is the first study to compare across generations the association between psychosis and neighbourhood ethnic density, taking advantage of a population cohort design where neighbourhood exposure is determined well in advance of illness onset. The register data, on which this was based, comprises all Danish residents and contains information on place of residence for almost everyone (99.7%) (Pedersen et al., 2006).

<table>
<thead>
<tr>
<th>Migrant group (country of origin)</th>
<th>1st generation</th>
<th>2nd generation</th>
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<tbody>
<tr>
<td></td>
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<td>Total (N)</td>
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</tr>
<tr>
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* Migrant group, for the first generation, is based on country of birth of cohort member and both parents and for the second generation, born in Denmark, the country of birth of both parents.

b The incidence rate measures the number of new cases per 10,000 person years at risk.

c Incidence rate ratios compare incidence of psychosis with native Danes adjusted for age, gender and calendar period.

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There are, though, some limitations to note: firstly, caution is needed when making comparisons between region of origin categories as these are far from homogenous, sometimes incorporating disparate ethnic groups with different migration experiences. We cannot, therefore, rule out the possibility that cross-generational differences may relate to different countries of origin from within these broad regions. However, the fact that cross-generational differences are so consistent suggests this alone is unlikely to explain the results we found. Secondly, the study is reliant on clinical data only for diagnosis and therefore potentially subject to bias due to differential service use. It is possible that migrant groups may be less inclined to engage with mental health services than the Danish population and this could be more likely in areas where migrants are more concentrated. However, if this were the case we would expect first generation migrants, compared to the second, to be less likely to contact services and more inclined to resist service use in high ethnic density areas. In fact, we find neither: first generation migrants were more likely to be diagnosed with psychosis compared to the second generation and less likely to demonstrate any corresponding ethnic density effect. Therefore, it appears that differential service use is unlikely to explain the different ethnic density effects we have reported here.

4.3. Comparison with previous studies

Our initial analysis showed a higher rate of psychosis among first compared to second generation migrants (Table 1). A recent review reports no statistical significant difference in psychosis risk between generations (Bourque et al., 2011). However, our study showing a greater risk among the first generation is in line with other Danish population studies (Cantor-Graae et al., 2003; Cantor-Graae and Pedersen, 2013).

The ethnic density effect we report for second generation migrants are in line with previous ethnic density studies where generations have been conflated (Boydell et al., 2001; Kirkbride et al., 2007b; Schofield et al., 2011a; Veling et al., 2008). Typically, studies have shown up to double the incidence of psychosis in low versus high ethnic density areas. The comparably larger effect sizes we have shown, particularly for second generation Africans, may be because previous studies miss-attributed ethnic density effects to the first generation.

4.4. Interpretation

By distinguishing between generations our results point to different causal processes behind the increased risk of psychosis among migrants. For the first generation, these may be more directly related to the migration process and, for refugees and forced migrants, experience of trauma in the country of origin. For the second generation, this is more likely related to the social context in which they are now living in Denmark. In fact, while migrants are at an overall increased risk of psychosis compared with native Danes, for the second generation in high ethnic density areas this difference is no longer statistically significant (Appendix Table 5).

The importance of social context for the second generation may be attributed to the stress of acculturation due to both marginalisation and assimilation. Marginalisation, a failure to identify with either the country of origin or the host country, is regarded as the least adaptive outcome of the acculturation process and the most likely to lead to mental ill health (Berry, 2005; Berry et al., 1987; Park, 1928). This has been linked with the ethnic density effect with those in low ethnic density areas more prone to experience marginalisation (Shaw et al., 2012). Poor mental health due to marginalised status may, in turn, be a feature of the 2nd generation; caught between their parents’ culture, from which they feel disconnected, and the host culture, with which they cannot identify (Bhugra et al., 1999; McIntyre et al., 2016; Williams et al., 2007). A second outcome of the acculturation process, assimilation,
describes relinquishing the culture of origin to become subsumed in the host culture (Berry, 1997). Again, this is associated with a greater risk of mental health problems and may be a more likely outcome for the second generation in areas where there are few people with their parents’ cultural background. It has also been proposed that discrimination could be an underlying factor; with migrants living in higher ethnic density areas subject to lower levels of discrimination (Becares et al., 2009; Halpern and Nazroo, 2000). Again, it is argued, this may be modified by generational status where the second generation could be more vulnerable to the impact of discrimination on their self-esteem and more likely to perceive discrimination as a threat to their identity (Nakash et al., 2012; Smith et al., 2009). It is notable that migrants from elsewhere in Europe show the lowest ethnic density effect, barely modified by generational status, and this may reflect both a less stressful acculturation process for this group and lower perceived discrimination. It is also possible that factors more specific to the Danish context may be relevant. For example, in Denmark there is a very strong emphasis on integrating migrants into Danish society which, some have argued (Lindley and Van Hear, 2007; Valentine et al., 2009), could intensify any potential conflict between the culture of origin and the host culture.

4.5. Implications

Could it be that the ethnic density effect, long established in aetiological research, is largely experienced by second generation migrants alone? This has important implications for the likely mechanism behind these effects and our understanding of how the increased risk of psychosis persists from one generation to the next. Therefore, further study is needed to address these questions in other international contexts.

Contributors

PS was responsible for the initial study design, analysis and interpretation of the study and drafting of the manuscript. LB, JD, EA, CP and MT were all involved in study design and interpretation of results. All authors contributed to and have approved the final manuscript.

Conflict of interest

The study authors have nothing to disclose.

Funding

This work was supported by a UK Medical Research Council fellowship (MR/K001582/1) to P.S.; a Hallsworth Research Fellowship and a UK Economic and Social Research Council Future Research Leaders grant (ES/K001582/1) to LB; Aarhus University, the Lundbeck Foundation, Børge Hvide, J., Fearon, P., Morgan, K., Murray, R.M., Walsh, E., Pedersen, C.B., 2010. Full spectrum of psychiatric outcomes among offspring with parental history of mental disorder. Arch. Gen. Psychiatry 67:822–829. https://doi.org/10.1001/archgenpsychiatry.2010.836.


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