

## EPIGENETICS AND MIGRATION - CONSIDERATIONS BASED ON THE INCIDENCE OF PSYCHOSIS IN SOUTH ASIANS IN LUTON, ENGLAND

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### SUMMARY

A higher rate of psychosis has been observed in immigrant populations as compared to the indigenous populations of the UK. Specifically, second generation immigrants (born in the UK) have been noted to have the highest risk. This phenomenon has been attributed to a number of genetic and social factors such as problems with acculturation. Previous studies in Luton, Bedfordshire have shown that the Bangladeshi community experience the highest rate of psychosis above all other ethnic minorities in this area. Here, we consider the lasting epigenetic impact of the stressor of migration and discuss the implications for further work and treatment.

**Key words:** epigenetics – migration – psychosis - South Asian - Bangladeshi

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### INTRODUCTION

The impact of migration as a mental health stressor has previously been explored. Work by Dr Robin Pinto in the 1970s focused on the South Asian community in Britain and concluded that the rate of psychosis in this population was higher than the indigenous group (Pinto 1970). A similar phenomenon has been noted in other ethnic minorities including the African-Caribbean population in the UK (Morgan 2006, Cantor Grae, 2005) as well as in sub-Saharan African migrants in Malta (Camilleri et al. 2010).

Previous work has highlighted the challenges that some immigrants may face as a result of the decision to migrate to a foreign country. In the UK, indices such as poor standard of housing, low socioeconomic status and issues with acculturation have been suggested as problems commonly faced by immigrant populations (Agius 2010, Dealberto 2007). The brunt of issues relating to acculturation may often be borne by the second-generation offspring (born in the UK) of immigrants who may experience the daily dichotomy between the culture of their parents and the culture of modern Britain. Second generation migrants may experience high levels of stress and anxiety resulting from the constant battle to reconcile their two cultures, aspects of which may be entirely incompatible. The increased social pressures and psychological difficulties experienced by this group could be one explanation for the higher risk of psychosis (Dealberto 2007). This theory is supported by a meta-analysis (Cantor Grae 2005) examining the impact of migration on rates of schizophrenia, which found that second generation

migrant offspring had a higher rate of developing schizophrenia than their parents.

Whilst a number of factors inevitably serve as an explanation for this phenomenon, including the points raised above about socio-cultural issues, here we consider the influence of epigenetics on rates of psychosis. The term epigenetics refers to reversible modifications made to the DNA and histones which are heritable and so can have lasting impact from one generation to the next. This concept has been applied to psychiatry and the idea of epigenetic dysregulation considered in relation to mental health disorder. A model of aberrant epigenetic influence in psychiatric disorders offers explanation for a number of attributes of the illnesses such as the discord in mental health illness between monozygotic twins (Connor 2008).

### EARLY INTERVENTION SERVICE

A study looking at an early intervention psychosis programme based in Luton, Bedfordshire, UK in 2010 (Agius 2010) provided useful insight into the differences in service use amongst ethnic minority populations. Luton and Bedfordshire are a crucible of ethnic diversity and despite the sample size in the study being a limitation, the sample did reflect the proportion of the different ethnic minority groups in the area. It was noted that in particular, the highest number of Early Intervention Service users belonged to the Bangladeshi ethnic group. Within Luton, a high rate of psychosis has been observed in Bangladeshi families. As the early intervention service is one that is used by patients aged between 14 and 35, the group studied was comprised of

second-generation migrants (Agius 2010). The conclusion of the paper was therefore that service provision must reflect the needs of the community and as such, aim to tailor the service to overcome language barriers, encourage individuals from ethnic minorities to engage as key workers and to increase awareness of mental health illness amongst the population in general.

It must be noted that much of the Bangladeshi community within Luton experience high levels of social deprivation and tend to live in inner city areas. (Agius 2009). Interestingly, it has been observed that there tends to be a higher rate of psychosis in urban areas compared to rural areas (Jones 2012, Dealberto, 2007). In addition, in Robin Pinto's study of saltation migration to the UK (Pinto 1970), the Silet Bangladeshi community tend to be more isolated and less willing to mix with the indigenous population as compared to other groups of migrants (Pinto 1970).

## GENETIC AND EPIGENETIC INFLUENCE

Genetic influence may be a contributing factor to the high rates of psychosis in the Bangladeshi community within Luton as well as the high stress indices and problems with acculturation. Genetic influences have previously been implicated in psychosis (Claes 2012). Consanguineous marriages within the Bangladeshi community may amplify genetic susceptibility. There is little work presenting exact figures for this phenomenon although consanguineous marriages are a well-known practice in South Asia and are widespread in Pakistan (Knight et al. 2008). Bangladesh was formerly known as East Pakistan and shares cultural ties with Pakistan.

In addition to genetic factors contributing to psychosis, the field of epigenetics has in recent years emerged to pose fascinating theories about how environmental factors can influence genes and these changes can be sustained over generations as heritable traits (Bredy 2006).

Epigenetics refers to changes to the expression of genes via reversible modifications to DNA. These modifications have been shown to be essential to normal development and regulation of the genome in so far as epigenetic mechanisms are thought to contribute in part to the stringent control of gene expression and regulation of DNA (Ptak 2010). The mechanism through which the DNA is thought to be modified is by a process of DNA methylation and histone deacetylation both of which are interlinked and responsible for a number of important functions relating to normal development (Dealberto 2007). Aberrant DNA methylation has however been linked to a number of brain disorders including mental retardation syndromes and tumours (Connor 2008). It has been suggested that environmental factors such as stress and nutrition can impact DNA modification mechanisms (Dealberto 2007).

It is already well known that one of the precipitants of psychosis can be stress and in the case of immigrants, the migration to a foreign country is likely to be a stressor (Jones 2012). According to the information that we know thus far about epigenetics, it has been suggested that migration is a sufficient stressor to induce reversible and heritable changes in DNA methylation/histone deacetylation. Additionally, the stress related to the problems with adjustment and social identity could also be significant enough to induce further epigenetic changes to DNA.

In the case of the increased rate in psychosis within the Bangladeshi community in the UK, it could therefore be suggested that the impact of the tremendous stressor of migration to the UK may be a sufficient trigger for epigenetic changes to occur to parental DNA and so these changes may be inherited by second generation migrants and could account for the higher rate of psychosis noted within this group. These changes could therefore increase susceptibility to psychosis within this community as the effect of migration is heritable by further generations. This may then be compounded by the stressful factors discussed earlier such as the issues relating to acculturation and social integration.

## FURTHER WORK

The hypothesis relating the stress of migration and acculturation in migrants has profound impact in modern multicultural Britain today. As mentioned earlier, migrant populations have a significantly higher rate of psychosis than their native counterparts and this inevitably, as we have seen in Luton, this has an impact on service provision (Agius 2010).

Additionally, the field of epigenetics poses new questions in terms of pharmacological management as the methylation of DNA and potential reversibility of it become the main focus. Pre-clinical trials of drugs targeting epigenetic mechanisms to treat psychosis are underway. This could have important implications for the way in which we treat psychosis and provide useful information about possible prevention (Peedicayil 2011).

In order to test the hypothesis, the next steps to be taken should involve the experimental haematological analysis of samples from second generation migrants, their parents and suitable controls from the native country. What is being suggested may be an explanation at the biomolecular level for the phenomena of higher rates of psychosis.

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