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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]☆

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ABSTRACT

Background: Little is known about associations between the social environment and risk for psychosis within rural settings. This study sought to investigate whether such associations exist within a rural context using a prospective dataset of unusual epidemiological completeness.
Method: Using the Cavan–Monaghan First Episode Psychosis Study database of people aged 16 years and older, both ecological analyses and multilevel modelling were applied to investigate associations between incidence of psychosis by place at onset and socio-environmental risk factors of material deprivation, social fragmentation and urban–rural classification across electoral divisions.
Results: The primary finding was an association between more deprived social contexts and higher rates of psychotic disorder, after adjustment for age and sex [all psychoses: incidence rate ratio (IRR) = 1.12, 95% CI (1.03–1.23)].
Conclusions: These findings support an association between adverse socio-environmental factors and increase in risk for psychosis by place at onset within a predominantly rural environment. This study suggests that social environmental characteristics may have an impact on risk across the urban–rural gradient.

1. Introduction

The past two decades have witnessed a revival of interest in the role of the social environment in the aetiology of psychotic disorders (Allardyce and Boydell, 2006; Cantor-Graae, 2007; Kirkbride et al., 2007). Socio-environmental risk factors are generally studied at two levels: (1) area-based (contextual) characteristics such as deprivation, social fragmentation and more recently social capital, and (2) individual-level (compositional) factors such as ethnicity, social class, social adversity and cannabis use. A classic example of contextual research is the seminal study by Faris and Dunham in Chicago in the 1930s (Faris and Dunham, 1939). Using first-admission data from psychiatric hospitals over a 12-year period, higher rates of schizophrenia were observed in inner city areas characterised by greater levels of social disorganisation and residential mobility; conversely, rates of 'manic-depressive' psychosis (i.e. bipolar disorder) appeared to follow a more random distribution. More recently, several studies have replicated the findings of Faris and Dunham: measures of social fragmentation, including residential mobility and the proportion of single and divorced people in the neighbourhood, were associated with high rates of psychosis (van Os et al., 2000; Silver et al., 2002); similarly, this pattern was evident when a composite measure (the social fragmentation index) was used (Allardyce et al., 2005).

Interactions with neighbourhood-level socio-environmental risk factors appear to be strongest in urban settings (Thornicroft et al., 1993; Allardyce et al., 2005; Zammit et al., 2010). Thus, it has been argued that neighbourhood-level variables may be responsible for differential rates of psychosis between urban and rural environments (Allardyce et al., 2005; Zammit et al., 2010). In Ireland, differential associations

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between urban and rural areas were found between neighbourhood-level characteristics and rates of self-harm and forensic admissions (O'Neill et al., 2005; Corcoran et al., 2007). The body of literature on contextual research comes from urban settings, with rural areas featuring mainly in urban–rural comparisons. Little is known about associations between the social environment and rates of psychosis within rural settings. In this study, we set out to investigate whether such associations exist within a wholly rural context in Ireland using a dataset of unusual epidemiological completeness.

2. Method

2.1. Study cohort

Subjects were participants in the Cavan–Monaghan First Episode Psychosis Study (CAMFEPS). This is a prospective study that seeks the closest approximation to identification of 'all' incident cases presenting with a first episode of any psychotic disorder in two rural counties in Ireland, Cavan and Monaghan, since 1995, as described previously in detail (Baldwin et al., 2005; Owoeye et al., 2013; Kingston et al., 2013).

In outline, the study involves the following ascertainment procedures: (a) cases identified from all treatment teams in the catchment areas, (b) cases from the catchment areas who present privately to St. Patrick's Hospital or St. John of God Hospital, Dublin, which together account for >98% of all national private psychiatric admissions, and (c) cases from the catchment areas having forensic admission to the Central Mental Hospital, Dublin. The primary criterion for entry to the study is a first lifetime episode of any psychotic illness at age 16 or above, with no upper age cut-off. DSM-IV diagnosis is made at inception, together with psychopathological and cognitive assessments, reported elsewhere (Owoeye et al., 2013; Kingston et al., 2013), with repeat DSM-IV diagnosis made at 6 months; there are no exclusion criteria other than a previously treated episode of psychosis or psychosis occurring with a prior, overriding diagnosis of gross neurodegenerative disease. This study was approved by the Research Ethics Committees of (initially) the North Eastern Health Board and (subsequent to reorganisation) the Health Service Executive Dublin North East Area, St. Patrick's Hospital, St. John of God Hospital and the Central Mental Hospital, to include (a) subjects giving informed consent to formal assessment and (b) obtaining diagnostic/demographic information from case notes/treating teams for subjects declining formal assessment.

Residence at onset was defined as each subject's domestic location over the 3-month period immediately prior to first presentation with a psychotic illness. For subjects with more than one address in the study area over this period, the address at which he or she was living for more than 50% of the time was applied. Subjects with a second address outside the study area were included only if they were living for more than 50% of the time in Cavan–Monaghan.

2.2. Setting

Cavan and Monaghan are two contiguous counties with a population of 109,139 [55,821 males and 53,318 females] at the 2002 census. The region is predominantly rural, consisting of dispersed farms with a scatter of villages and small towns, in the absence of any major urban areas (Central Statistics Office, 2003). The largest towns are the county towns, Cavan and Monaghan, with populations of 5572 and 5557 respectively in 2002. Only one other town had a population of more than 3000 [Carrickmacross, population 3614]. Both counties are ethnically homogeneous, with the vast majority of the population being white Irish. The study is based within Cavan–Monaghan Mental Health Service, a community-based service model comprising two community mental health teams, including home-based treatment teams, a specialist service for the elderly and a community rehabilitation team. Central to the delivery of health services in this model is the use of home-based treatment as an alternative to hospital admission (McCauley et al., 2003; Iqbal et al., 2012). Electoral divisions (EDs) constitute the smallest administrative sub-regions below county level for which census population data are available. The study region contains a total of 155 EDs having a population mean per ED of 697 in 2002 (Central Statistics Office, 2003).

2.3. Neighbourhood-level characteristics

ED-based measures were calculated using information from the 2002 census (Central Statistics Office, 2003); this census was closest to the midpoint of the present study (1995–2007).

2.3.1. Material deprivation

Material deprivation was quantified using a deprivation index, similar to the Carstairs (Carstairs and Morris, 1991) and Townsend (Townsend et al., 1988) indices often used in the UK, that was developed by the Small Area Health Research Unit (SAHRU) in Trinity College Dublin (Kelly and Teljeur, 2004). The material deprivation index has been previously used in a variety of contexts, including studies of the availability of psychiatric services (O'Keane et al., 2004), forensic admissions (O'Neill et al., 2005), benzodiazepine consumption (Quigley et al., 2006) and self-harm (Corcoran et al., 2007). This index was constructed for each ED by applying principal components analysis to a combination of selected census-based indicators, including unemployment, social class, type of house tenure and car ownership. EDs are divided into ten categories on an ordinal scale, with 1 being least deprived and 10 most deprived. For the present analyses, these were collapsed into five categories [1 = 1 & 2; 2 = 3 & 4; 3 = 5 & 6; 4 = 7 & 8; 5 = 9 & 10]. Mean deprivation scores and standard deviations (SDs) for the three categories of rurality utilised (see Section 2.3.3 *Urban–rural classification*) were: rural, −0.37 (0.69); village, 0.52 (0.82); and town, 1.80 (0.67).

2.3.2. Social fragmentation

The social fragmentation index (SFI) was developed for a study of suicide in London (Congdon, 1996). We calculated SFI by adding z scores of four census variables for each ED: 1) non-married adults, 2) single-person households, 3) population turnover and 4) private renting. For the present analyses, the index was collapsed into four categories, created by quartiles, with 1 being least socially fragmented and 4 most socially fragmented. Mean fragmentation scores and standard deviations (SDs) for the three categories of rurality utilised (see Section 2.3.3 *Urban–rural classification*) were: rural, −0.59 (1.96); village, 1.90 (1.36); and town, 4.96 (2.74).

2.3.3. Urban–rural classification

This classification, developed by SAHRU for health services research at the small area level in Ireland, combines multiple variables, including population density, settlement size and proximity to urban centres (Teljeur and Kelly, 2008); EDs are divided into six categories on an ordinal scale, with 1 being most rural and 6 most urban. For ecological analyses, the urban–rural classification (URC) was collapsed into a three-category variable: URC3 (1 = rural; 2 = village, 3 = town). For multilevel analyses, both URC3 and URC2 (1 = rural, 2 = village & town) were used.

2.4. Statistical analysis

We adopted two complementary approaches to data analysis:

First, in accordance with previous literature (Allardyce et al., 2005; Abas et al., 2006; O'Reilly et al., 2008), we aggregated EDs according to neighbourhood-level indices (deprivation scores, fragmentation quartiles and rurality categories), ignoring spatial contiguity. Age-standardised incidence rates (SIRs) were calculated for each category and rate ratios (RRs), with 95% confidence intervals (95% CIs) and associated probabilities, were obtained using category 1 for each neighbourhood-level characteristic as the reference category.