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Schizophrenia and the city: A review of literature and prospective study of psychosis and urbanicity in Ireland

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ABSTRACT

Urbanicity has been repeatedly associated with increased incidence of schizophrenia. This article (a) presents results of a prospective study of urbanicity and schizophrenia in Ireland and (b) reviews the literature relating to urbanicity and schizophrenia. We prospectively compared incidence of schizophrenia and other psychoses in urban and rural catchment areas (over 4 years and 7 years, respectively) using face-to-face, DSM-III-R diagnostic interviews. Incidence of schizophrenia in males was higher in urban compared to rural areas, with an age-adjusted incidence rate ratio (IRR) of 1.92 (1.52–2.44) for males and 1.34 (1.00–1.80) for females. Incidence of affective psychosis was lower in urban compared to rural areas for males (IRR 0.48; 0.34–0.67) and females (IRR 0.60; 0.43–0.83). These findings are consistent with the literature, which provides persuasive evidence that risk for schizophrenia increases with urban birth and/or upbringing, especially among males. Register-based studies support this conclusion more consistently than studies using face-to-face diagnostic interviews, the difference being related to power. The mechanism of association is unclear but may relate to biological or social/environmental factors or both, acting considerably before psychotic symptoms manifest. There is a diversity of potential candidates, including air pollution, cannabis and social exclusion. Urbanicity may have a synergistic effect with genetic vulnerability. Future research is likely to focus on the relationship between urbanicity and neural maldevelopment, the possibility of rural protective factors (e.g. social capital, low social fragmentation), urbanicity in developing countries, cultural variables and geographical location, and associations between urbanicity and other disorders (e.g. affective psychosis).

1. Introduction

Cities are growing at faster rates and in greater numbers than ever before. In 1800, 3% of the world's population lived in cities; in 1900, 14% lived in cities; today, over 50% live in cities (UN-Habitat, 2001). The rate of urban growth is greatest in Africa where, in 2000, 37% of the population lived in cities; by 2020, 48% will live in cities (UN-Habitat, 2003).

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Urban residence is associated with increased rates of medical illness (Godfrey and Julien, 2005) including coronary heart disease (Ahmad and Bhopal, 2005), diabetes mellitus (Papoz et al., 1996), metabolic syndrome (Gu et al., 2005), childhood asthma (Dik et al., 2004) and cancers of the esophagus, liver, cervix and female breast (Howe et al., 1993; Kelsey and Horn-Ross, 1993). Urban residence is also associated with increased rates of mental illness (Lewis and Booth, 1992), including childhood psychiatric disorders (Rutter, 1981), adult depression (Sundquist et al., 2004) and adult neurotic disorders (Vazquez Barquero et al., 1982; Blazer et al., 1991). A number of studies have suggested links between schizophrenia and urban birth (Mortensen et al., 1999), urban upbringing (Pedersen and Mortensen, 2001a) and urban residence at time of presentation (Sundquist et al., 2004).

The proposed link between schizophrenia and urbanicity is increasingly important not only because urban populations are growing in size, especially in Africa, Asia and Latin America, but also because many areas, in parallel with urbanization, are also experiencing 'westernization' of the epidemiology of both medical (Kelsey and Horn-Ross, 1993; Papoz et al., 1996; Echimane et al., 2000) and psychiatric illness (Eide and Acuda, 1996; Le Grange et al., 1998). If this trend includes schizophrenia there is likely to be a rapid increase in both the incidence and prevalence of schizophrenia in Africa, Asia and Latin America; this may be further compounded by the possibility that the incidence of schizophrenia *within* cities may also be increasing (Boydell et al., 2003).

These demographic and epidemiological developments highlight the need to develop an epidemiological understanding of the association between urbanicity and schizophrenia, to help identify the biological mechanisms that underpin this association and inform the development of public health programmes for the treatment and, ultimately, prevention of mental illness in urban areas. The aims of this paper are to (a) present the results of a prospective study of urbanicity and psychosis in Ireland; and (b) review the literature relating to urbanicity and schizophrenia.

2. Methods

2.1. Prospective study methods

We prospectively identified all individuals with a psychotic episode making their first contact with psychiatric services in (a) a geographically-defined, urban catchment area in South Dublin (1995–1998) with a population density of 15.11 persons per hectare (total population 165,000) (Browne et al., 2000; Whitty et al., 2004) and (b) in two contiguous, geographically-defined, rural catchment areas in North East Ireland (Counties Cavan and Monaghan, 1995–2001) (Scully et al., 2002; Baldwin et al., 2005), with population densities of 0.29 per hectare (Cavan) and 0.41 per hectare (Monaghan), and a total population of 102, 810. Cases were defined as individuals with a first ever presentation to any psychiatric service with a psychotic episode, provided that (i) there was no previous treatment for psychosis or possible psychosis; (ii) current inpatient or outpatient treatment had not commenced more than 30 days prior to referral to our centers; and (iii) they were resident in the catchment area. Psychiatric services in both urban and rural areas are community-based, with a particular focus on a 'home-care' model of care in the rural area. A strict catchment area policy operates in Ireland and those presenting to a catchment area other than that of their residence are referred to their local catchment area as soon as is practicable.

We assessed all individuals, irrespective of age, presenting with symptoms suggestive of psychosis. We interviewed each individual using the Structured Clinical Interview for DSM-III-R (SCID) (Spitzer et al., 1987) and subsequently for DSM-IV (First et al., 1995) and diagnosed schizophrenia or another psychotic illness as appropriate. We obtained data for the general populations for each area (urban and rural), stratified by age and gender, from the Irish Central Statistics Office (CSO) based on the 1996 census (CSO, 2002). Data regarding population density, ethnicity and economic status were also obtained from the CSO; over 96% of the population of both regions was ethnically Irish at the time of the study and total income per person was approximately 20% higher in the urban area.

The individual unadjusted incidence rates were calculated using the Poisson likelihood method (Clayton and Hills, 2003). The age-adjusted Incidence Risk Ratio (IRR) and its associated confidence interval was computed using the Poisson multiplicative (relative) risk regression model separately for each gender and diagnostic group. The EGRET software package was used for these models (Cytel Software Corporation, 2001). Ethical approval was obtained from the relevant research ethics committee prior to commencing the study.

2.2. Review of literature methods

We performed extensive electronic literature searches using Ovid Medline (United States National Library of Medicine, 1966–2009) and PsycInfo (American Psychological Association, 1872–2009), using the following combinations of search terms: "schizophrenia" and "urbanicity"; "schizophrenia" and "urban"; "schizophrenia" and "rural"; "psychosis" and "urbanicity"; "psychosis" and "urban"; "psychosis" and "rural". We identified further articles by tracking back through references from relevant papers and book chapters. We contacted corresponding authors to request copies of specific papers identified in our search and to request copies of related papers.

Each paper was assessed by at least two authors to determine its suitability for inclusion in the review. Inclusion criteria were:

(a) The paper must report original incidence data for schizophrenia, which form the basis for a measure of effect for the relationship between urbanicity and schizophrenia;
(b) The paper must report a study involving patients of urban birth, upbringing and/or residence and patients of rural birth, upbringing and/or residence, with common methodologies for case-identification used in all patients;
(c) The paper must have been published in an English language, peer-reviewed medical or psychiatric journal.