Shared social environment and psychiatric disorder: a multilevel analysis of individual and ecological effects

Abstract We examined associations, in terms of relative and population-attributable risks, between shared social environment at the neighbourhood level and (1) treated incidence of non-psychotic, non-organic disorders, and (2) subsequent level of service consumption. The multilevel analysis used linked records of all individuals in contact for the first time with any catchment area mental health service for non-psychotic, non-organic disorder over various specified time periods between 1981 and 1995. Socioeconomic indicators of 36 neighbourhoods in the city of Maastricht yielded a multivariately defined neighbourhood deprivation score. There were significant linear trends in the association between level of deprivation and treated incidence, especially in the population under 35 years of age (adjusted rate ratio for linear trend 1.17, 95% confident interval 1.11–1.23), who constituted around half of the patient population. The fraction of the incidence of psychiatric disorder attributable to deprivation was 17.8%. Multilevel analyses of rates of a second cohort, with cases divided according to level of service use over a standardised follow-up of 5 years after first contact with psychiatric services, revealed that the effect of deprivation scores on rates declined with intensity of out-patient service use, but increased with level of in-patient use. Up to 50% of in-patient episodes in this group could be attributed to neighbourhood level of deprivation. The increase in risk conferred by neighbourhood deprivation remained after adjustment for the individual-level equivalent. The findings therefore suggest that elements in the shared social environment influence both incidence and severity of non-psychotic, non-organic disorders, over and above any individual-level effect.

Introduction

There is evidence that the shared social environment at the neighbourhood level may be an important determinant of health differences in the general population (Lillie-Blanton and Laveist 1996; Shouls et al. 1996; Diez-Roux et al. 1997; Sampson et al. 1997; Van Os et al. 1997) Many studies have reported associations between neighbourhood characteristics and treated incidence of psychiatric disorders, attributing these to different levels of needs in the population (e.g. Cooper et al. 1977; Gigs 1980; Maylath et al. 1989; Tansella et al. 1993; Thornicroft et al. 1993; Harrison et al. 1995).

In this study, we wished to address the following issues. First, many studies examined only rates of admission to hospital (e.g. Thornicroft 1991; Jarman et al. 1992). This approach cannot detect low levels of hospitalisation being compensated by high levels of out-patient or day-patient contacts (or vice versa). Second, higher levels of service use in some areas may be associated with higher levels of onset of new cases (incidence) or a more deteriorated illness course in existing cases (prevalence), each requiring a different approach from service planners. Care must therefore be taken to separate incident from prevalent cases. A person making a first contact with a case register is not necessarily incident, because the individual may have had many contacts before the start of the case register. Thus, a person making a first contact in the first year of the case register is less likely to be incident than a person living in the same area who makes a first contact in the 10th year. Third, while rates of service use have been shown to correlate with neighbourhood characteristics (that is, have been shown to a degree to lie on the same straight line), very little is known about the strength of the association in terms of relative and attributable risks and dose-response relationships, despite these being the appropriate epidemiological measures with which to judge causality and public health
importance (Hennekens and Buring 1987), and therefore funding needs. Fourth, mental health service use in some European countries such as the United Kingdom is restricted because of the requirement to pass important "filters" (Goldberg 1995), the most important of which are the filters of general practitioner (GP) recognition of mental health disorder, and the GP decision to refer the patient on to the mental health services. If the object of study is the relationship between the social environment of the source population and mental health service use, a more accurate picture would be obtained if individuals had the right to "bypass" GPs and refer themselves directly to services. Fifth, previous studies have not used statistical models that incorporate the fact that individuals within neighbourhoods share common features. They are therefore not completely independent entities as assumed in ordinary linear modelling. It is known that treatment of clustered data as if they were obtained under a simple random sampling scheme can lead to serious inferential errors (Goldstein 1987). A multilevel, random regression modelling procedure, as applied in a number of recent studies (Shouls et al. 1996; Diez-Roux et al. 1997; Sampson et al. 1997), takes into account the intraclass correlation among measurements within neighbourhoods. Finally, and possibly most importantly, it is not known whether associations between psychiatric morbidity and neighbourhood social indicators represent individual or ecological effects. Many studies in this area have taken the position that ecological models are merely imperfect substitutes for individual-level models. This, however, may represent what has been called the "fallacy of the ecological fallacy" (Schwartz 1994). For example, high rates of mental disorder in areas with high proportions of low-income families with broken marriages and high rates of unemployment could merely indicate that these characteristics predispose to disorder on an individual basis (individual effect; Van Os et al. 1995). The alternative, however, is that the effect of deprivation is not confined to individuals with these particular characteristics, but spreads so that the increased risk conferred by living in such an area is to some extent shared by anyone living there, regardless of income, marital status or employment (ecological effect; see Rutter 1981).

The present study attempted to deal with the above issues, by

1. Identifying cohorts of individuals living in a defined geographical area presenting for the first time in (a) at least 10 years or (b) at least 5 years to any type of psychiatric service with non-psychotic, non-organic disorders without the need for GP referral
2. Assessing patterns of subsequent service use over a standardised period of time
3. Relating 1 and 2 to five-dimensional (age, sex, marital status, neighbourhood, year) population data using multilevel modelling procedures.

### Methods

Since 1981, the Maastricht Mental Health Case Register (MMCR; Hamers et al. 1986) has cumulatively collected, through a probability record linkage procedure, data on all mental health contacts (psychiatric hospital, community mental health centre, psychiatric department of university hospital, community psychiatric emergency outreach team, psychogeriatric nursing homes, sheltered housing, child psychiatric services, services for the mentally impaired, alcohol and drug misuse services) and demographic and diagnostic data in a region of around 200,000 population (city of Maastricht: 120,000; surrounding areas: 80,000).

Maastricht is a relatively small city (population 120,000), located in the extreme south of the Netherlands in the province of Limburg. There are strong local traditions and Limburg has its own, officially recognised, language. Compared to the densely populated and more industrialised areas of the north-west of the country, levels of immigration of foreign nationals over the past decades have been low.

The observation frame for the current study was defined by four criteria:

1. Having been coded as living in the city of Maastricht at all mental health contacts
2. Registered contacts occurred between 1981 and 1995
3. Exclusion of ICD diagnosis of organic mental disorder (ICD 290–294) and ICD psychotic disorder (ICD 295–298)
4. Exclusion of contacts with child psychiatric services, alcohol and drug misuse services (which are separate from general psychiatric services in the Netherlands), and services for the mentally impaired and for patients with dementia.

By confining the analyses to the city of Maastricht, with the exclusion of the surrounding villages, any effect of distance to psychiatric services was minimised, as within the city of Maastricht all distances to mental health services can easily be covered by bicycle. Individuals with (rare) chronic psychotic disorders were excluded, because the very high levels of service use of this much smaller group would drown service use figures of individuals with much more prevalent non-psychotic psychiatric disorders. In the Netherlands, the great majority of individuals with non-psychotic, non-organic disorders are seen at the community mental health centre (CMHC), which are located in every major city. No GP referral is needed for treatment at the CMHCs; individuals can call the administrative department of the CMHC directly and will receive an appointment within around 3 weeks without medical screening. Indeed, patients not infrequently visit the CMHC indicating that they do not wish their GP to be informed of the reason of the visit. It has been shown that this possibility of "bypassing" the GP leads to a high prevalence rate of mental disorder at level 4 (mental health services), compared to systems where this possibility does not exist (Goldberg 1995).

Dependent variables: 10-year incident cases

Individuals living in the city of Maastricht with no known contacts with services for at least 10 years prior to first contact (that is, presenting for the first time between 1991 and 1995 with no contacts in the period 1981–1990) were considered as incident cases (10-year incident cases). The great majority of these had their initial contact with the CMHC.

Dependent variables: service consumption of 5-year incident cases

In order to examine associations between neighbourhood characteristics and service consumption, we identified a sample of minimally 5-year incident cases (presenting for the first time between 1986 and 1990 with no contacts in the period 1981–1984), who were followed up through the register for a period of 5 years (thus excluding individuals presenting for the first time after 1990, as their