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Schizophrenia and offending: area of residence and the impact of social disorganisation and urbanicity

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INTRODUCTION

Schizophrenia is the most common of the psychotic disorders and is characterised by fundamental distortions of thought (delusions), perception (hallucinations) and emotional response. It is a disabling illness, with a lifetime population prevalence of 0.5% to 1.7% (Jablensky et al 1992). The estimated one-month treated prevalence of psychotic illness in Australia is 4.7 per 1000 estimated resident population aged 18-64 (Jablensky et al 2000). This figure does not include those persons not in contact with treatment services. The place in society and the care of people with severe mental illness such as schizophrenia constitutes one of the thorniest issues in public health and social policy worldwide. In recent years, advances in the management of this disorder have made it possible for an increasing number of individuals with schizophrenia to lead semi-dependent or independent lives in the community. However, irrespective of the deinstitutionalisation of mental health care and the concomitant focus on the human rights of the mentally ill, the capacity of communities and of society at large to deal with emerging problems of criminalisation of mental illness and of marginalisation, homelessness, poverty and victimisation has been put to a severe test. This has been compounded by widespread stereotyping and stigmatisation of individuals with mental illness. The 1996 General Social Survey (US) revealed 'an underlying negative attitude to persons with mental health problems, an exaggeration of the impairments or "threat" associated with these disorders, and a startling negativity towards individuals with substance dependence problems' (Pescosolido et al 1999).

Information on the prevalence of police contact for individuals diagnosed with schizophrenia and other psychiatric disorders is of vital importance for public policy. Resources are available in courts and corrections to identify and provide services for individuals with mental health problems. However, the adequacy of service levels and their geographic spread is unknown. Furthermore, there is a need to identify trends in the demand for services over time. Moreover, offenders do not form a homogenous group and rates of offending vary within different groups and across different areas (Silver 2000). In particular, little is known in Australia about the social ecology of offending by persons with schizophrenia, including the impact of neighbourhood on rates and patterns of offending. These issues are increasingly important in the context of deinstitutionalisation, with some arguing that inadequate support for persons with a mental illness has led to the criminalisation of mental illness (Coid et al 1993). Other findings suggest that persons with a mental illness are particularly vulnerable to detection and arrest when they do break the law (Robertson 1988). However, while factors related to locality of residence may affect timely access to appropriate services, Silver (2000) argues that the level of social disorganisation within a neighbourhood exerts a significant independent effect that is not mediated by the availability of social support.

A pioneering study of area effects in Chicago (Faris & Dunham 1939) found high rates of schizophrenia in inner city areas and proposed that a deficiency in social integration combined with individual characteristics to produce these observed rates in socially disorganised areas. Since then there has been an expectation that needs for services are connected with neighbourhood characteristics (Goldsmith et al 1998) and a recent study on schizophrenia,

neighbourhood and crime (Lögdberg et al 2004) found that the prevalence of schizophrenia covaried with indices of social disorganization. Nevertheless, the relative importance of individual- and area-based factors in the determination of needs has been questioned. Recently, several studies have used multilevel modeling to examine the joint impact of individual socio-demographic factors and area characteristics to address this issue. These studies have generally shown that area characteristics remain significant predictors of schizophrenia prevalence, even though they are attenuated when a range of individual and household factors are included in the predictive models (Goldsmith et al 1998, Silver et al 2002, Van Os et al 2000).

Research into the distribution of crime across areas has an even longer history (Quetelet 1842,1996) and social disorganisation theory has made an important contribution to our understanding of the ways in which neighbourhoods influence crime rates (Shaw & McKay 1942). Social disorganisation has been defined as the inability of a community structure to realise the common values of its residents and maintain social controls. Its structural correlates include disadvantage, social mobility and ethnic heterogeneity which are hypothesised to de-stabilise neighbourhood cohesion, trust and communication. After suffering a period of disinterest, social disorganisation theory has reemerged strongly in criminology over the past 20 years (Bursik & Grasmick 1993, Sampson 2000, Sampson et al 1999, Sampson et al 1997). The 'new' theorists of social disorganization, while retaining continuities with Shaw and McKay, emphasize the need for direct measures of social disorganisation, not simply their structural antecedents. In particular Robert Sampson has developed the concept of *collective efficacy*, a characteristic of neighbourhoods, that links mutual trust between residents and a willingness to intervene for the common good (Sampson 2000). This construct is hypothesised to mediate the effects of neighbourhood social structure.

However there is little data on whether social disorganisation and other neighbourhood factors have a differential impact on offending by persons with schizophrenia compared to those without a mental illness. In one of the most ambitious studies of the association between violence and mental illness to date, the MacArthur Study, (Steadman et al 1998) found that the prevalence of violence committed by patients and non-patients living in the same neighbourhoods was similar – in the absence of substance abuse. Furthermore an important paper (Silver 2000), using data from the MacArthur Study, applied social disorganisation theory to the offending of psychiatric patients and found that key neighbourhood characteristics (specifically neighbourhood disadvantage and mobility) predicted violence after hospital release, even when individual-level factors were taken into account.

AIMS

The aims of this study were to identify the influence of area of residence on the identification of mental illness and offending. Area of residence has been characterised according to three main categories – disadvantage, social disorganisation, and urbanicity. Specific questions include:

- What is the prevalence of schizophrenia and arrest in different types of area?
- Does area of residence influence the joint prevalence of arrest and schizophrenia?
- Does area of residence influence the sequence of contact for individuals with both recorded arrests and schizophrenia?

METHODS

This is a study based on record linkage between two population-based registers, the Western Australian Mental Health Information System (MHIS) and the Western Australian Offenders Database (WAOD), using a probabilistic data matching strategy (Jaro 1994) and undertaken prior to this study by an independent third party, the Data Linkage Unit. Using the Data Linkage Unit, which was established within the Department of Health, Western Australia with the express purpose of undertaking record linkage between sensitive State databases, obviated the need for any direct exchange of data between data custodians in police and mental health departments, and the study researchers were given anonymised data only.

The Western Australian Mental Health Information System and the Western Australian Offenders Database, are State-wide, computerised registers with a comprehensive coverage of their respective areas. The Mental Health Information System commenced in 1966 and covers inpatient and ambulatory care contacts with the range of public mental health services in Western Australia, as well as inpatient contacts at private hospitals. The Offenders Database includes basic socio-demographic data on all offenders since the 1940s, with full data on charges, arrests and, at the time of linkage, convictions from 1984 to 1996. Due to incomplete ascertainment of offences for the first year of the full database, 1984 was excluded from the analysis of whole-of-population data.

Study populations

Three study populations were identified for analysis in this study. The first set was the total study population consisting of: (i) all individuals on the Mental Health Information System with a diagnosis of schizophrenia; (ii) individuals on the Offenders Database with a recorded arrest between 1985 and 1996 and (iii) individuals on the Mental Health Information System with both an arrest and a schizophrenia diagnosis recorded between 1985 and 1996.

Diagnostic classification

Psychiatric disorders were classified using the diagnosis made at the time of the last contact recorded on the mental health register. If this diagnosis was not available, the most recent diagnosis recorded on the register was used. The ICD-9-CM diagnostic classification system (World Health Organisation 1979) was used. In the study, diagnoses were limited to schizophrenia (ICD-9 295). The reliability of register diagnoses on the mental health register, including the best method of extracting a register diagnosis for epidemiological research, has been independently validated (Jablensky et al 2005).

Offence classification

Offences were classified using the 3-digit Australian Bureau of Statistics Australian National Classification of Offences (ANCO) offence categories for analysis. (Australian Bureau of Statistics 1985). The principal analyses in this study are based on an arrest for any offence, however breakdowns are also given by broad category of offence.

Individual-level measures

Several demographic variables were available for analysis at the individual level. These included sex, indigenous status and age.

Area-based measures

In addition to individual characteristics, measures of social disorganisation (disadvantage, mobility and ethnic heterogeneity) and urbanicity were constructed at area-level as described below. Postcodes were allocated into quartiles for each indicator so that approximately a quarter of the population is assigned to each of the four levels of the indicator. Urbanicity was an exception to this coding strategy, since 74% of Western Australians live in metropolitan Perth (ABS 2007).

Social disorganisation: Socio-economic disadvantage, inequality, residential mobility and ethnic heterogeneity

Socioeconomic disadvantage was measured using the 1991 Index of Relative Socio-Economic Disadvantage constructed by the Australian Bureau of Statistics. A description of the method used to construct this index is given in ABS (1994). Using small spatial units known as collector's districts as building blocks, a SEIFA score may be calculated for larger areas, and for the current study the spatial unit for assigning SEIFA was postcode. In addition to the SEIFA score for each postcode a measure of within postcode inequality was generated, by calculating the variance of the SEIFA measures for collection districts within each postcode.

Other social disorganisation indicators were constructed at the postcode level, by aggregating individual- and household-level census data. Variables included residential mobility and ethnic heterogeneity. Residential mobility was based on the percentages of householders who were at a different address 5 years ago, and ethnic heterogeneity was determined using the formula: $1-\sum \mathrm{P}_i^{\,2}$, where the P_i are proportions and i is defined according to the factors (a) percent whose first language is not English, and (b) percent Indigenous. This measure is at its greatest when the diversity within a population is highest.

Urbanicity

Urbanicity was measured by allocating postcodes into one of three categories: towns or rural areas with population less than 8,000, towns with populations from 8,000 to 20,000; and cities and towns with populations of over 20,000. The majority of individuals reside in Perth postcodes and are assigned to the last category.

Location of residence and of offender

The relevant postcode for schizophrenia prevalence was postcode of residence at the time of first prevalent contact with mental health services within the prevalence period. For arrest prevalence and also for analysis of the linked schizophrenia-arrest cases, the relevant postcode was postcode of arrest for the time of first arrest in the prevalence period.

Prevalence analysis: definitions and population denominators

The analysis that follows is based on the prevalence of schizophrenia diagnosis, arrest, and both schizophrenia and arrest for the entire period 1985 to 1996. Population and the social disorganisation and urbanicity indicators were taken from 1991 census data, an approximate mid-point of the period over which data for schizophrenia and arrest were observed. Population denominators were determined using Australian Bureau of Statistics Census data in the following

way. For arrest prevalence rates, and for the linked arrest and schizophrenia diagnosis rates, the denominator was the total population in each postcode. For the prevalence rates of schizophrenia diagnosis, the denominator was the population aged 15-54 in each postcode, matching the age group used in the schizophrenia diagnosis numerator.

RESULTS

The first aim of the study was to separately determine the prevalence of arrest, schizophrenia, and also the prevalence of arrest in persons diagnosed with schizophrenia in Western Australia over the period 1985 to 1996. The state-wide findings with respect to prevalence are shown in Table 1.

Table 1: Population prevalence of arrest, of a diagnosis of schizophrenia, and joint prevalence of having an arrest and a diagnosis of schizophrenia in Western Australia, 1985-1996, per thousand of relevant population(see above)

Prevalence type	*Persons arrested*	*Persons with a diagnosis of schizophrenia*	*Persons with schizophrenia diagnosis who were arrested*
Population prevalence 1985-1996 per thousand persons			
All persons	145.3	2.0	1.1
Males	227.1	2.9	1.8
Females	64.5	1.3	0.3

The Table clearly shows the high prevalence of arrest across the State of Western Australia. Over the 12 years of the study, 14.5 percent of the population had experienced an arrest. By comparison, schizophrenia itself was much less prevalent in the population, and the joint prevalence of having a diagnosis of schizophrenia and an arrest was rarer still.

The prevalences within specific offence categories are shown in Table 2.

Table 2: Broad offence category for arrest prevalence in Western Australia1985-1996 per thousand total population

	Offences against the person	*Property offences*	*Drug offences*	*Traffic offences*	*Other offences*
All persons	21.0	53.2	27.3	68.8	35.5

These specific forms of arrest prevalence add up to a higher figure than total prevalence for persons arrested because an individual may appear in the prevalence column for more than one offence category. Serious traffic offences make a major contribution to total arrest prevalence, and the category is dominated by drink-driving charges. On the other hand, arrest for offences against the person is much less prevalent.

The current study was particularly focused on the extent to which urbanicity and the structural antecedents of social disorganisation are correlates of arrest, schizophrenia diagnosis, and also schizophrenia diagnosis and arrest. As discussed, social disorganisation indicators were gathered at postcode level and the three forms of prevalence were measured in different area types. In order to show the influence of these area-types most clearly, the following charts are normalised so that the value of lowest quartile is set to 1 and the values of successive quartiles are expressed as rate ratios with respect to this reference point. The resulting charts allow easy visual assessment of the relative influence of each social disorganisation variable on each form of prevalence.

Figure 1 shows that prevalence of arrest was correlated with the indicators of social disorganisation at postcode level. However, the rise in arrest prevalence is strongest in the highest quartile of each indicator. The main exception to this trend occurs with urbanicity where there is little variation. Postcodes within the Perth metropolitan area and country towns of 20,000 population or more exhibited lower rates of arrest than postcodes associated with towns of less than 20,000. This pattern held for most offence categories (not shown) except for offences against the person, where there was a gradual but very small rise in prevalence with increasing urban size. The most even gradient across postcode quartile levels occurs for disadvantage, but the largest effect is still in the most disadvantaged quartile. For this indicator, arrest prevalence is almost 5 times as high as it is in the lowest quartile.

Figure 2 indicates a much shallower gradient for urbanicity and social disorganisation factors at postcode level in the case of schizophrenia prevalence. In particular, there is little difference in prevalence for different quartiles of residential mobility. Urbanicity has a modest effect, although there is a more consistent gradient than there is for arrest, with prevalence increasing slightly with increasing urban size. Postcode inequality has a more even gradient for schizophrenia prevalence, even though the prevalence ratio between the highest and lowest quartiles is not as great as it is for arrest. As ethnic heterogeneity across postcodes, disadvantage across postcodes, and within-postcode inequality increase from quartile 1 to quartile 4 schizophrenia prevalence doubles

The joint prevalence of arrest and schizophrenia diagnosis more closely resembles the arrest profiles than the schizophrenia profiles. As for arrest, the largest differences across postcodes occur between the highest quartile of each indicator and the other three. Furthermore, there does not seem to be a multiplier effect for the joint distribution of schizophrenia and arrest prevalence as the rate ratios for arrest and for the joint distribution of arrest and schizophrenia diagnosis are comparable with each other.

The study also examined the temporal relationship between schizophrenia diagnosis and arrest across postcodes. It is known that for the majority of individuals in Western Australia with both an arrest and a diagnosis of schizophrenia, the arrest will precede the schizophrenia diagnosis (Jablensky et al 2004). This study has examined sequences of arrest and diagnosis across postcodes and found some inconsistency and complexity in the results across different indicators of social disorganisation. While the tabulations are not presented in this trends and issues paper, there is *some* evidence of a shift in sequence across areas, with diagnosis being more likely to precede arrest as postcodes become more socially disorganised. This is a matter worthy of further investigation and hypothesis testing and it is not put forward as a clear result emerging from this study.

Figure 1: Arrest prevalence rate-ratios: 1985-96

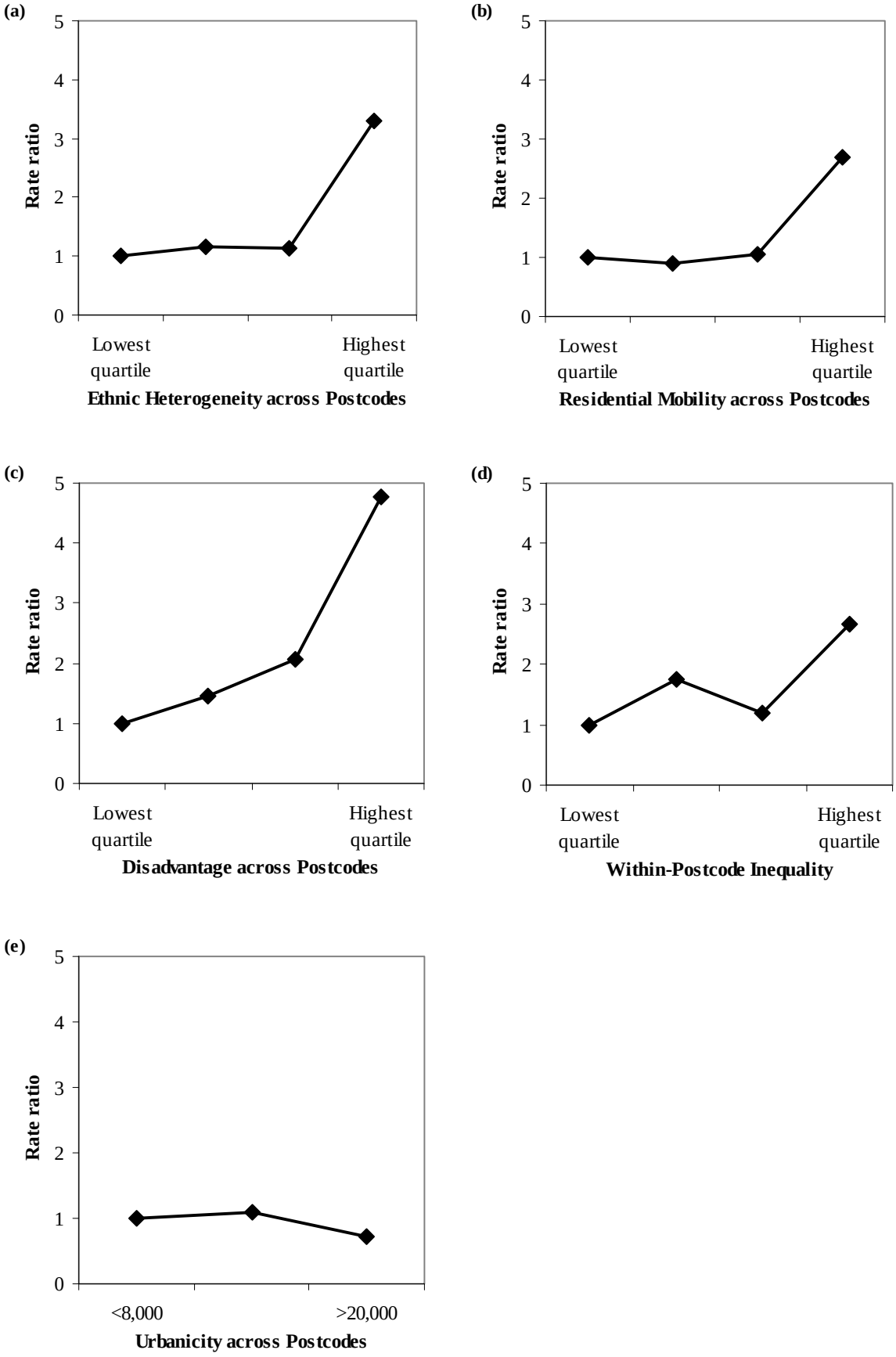


Figure 2: Schizophrenia prevalence rate-ratios: 1985-96

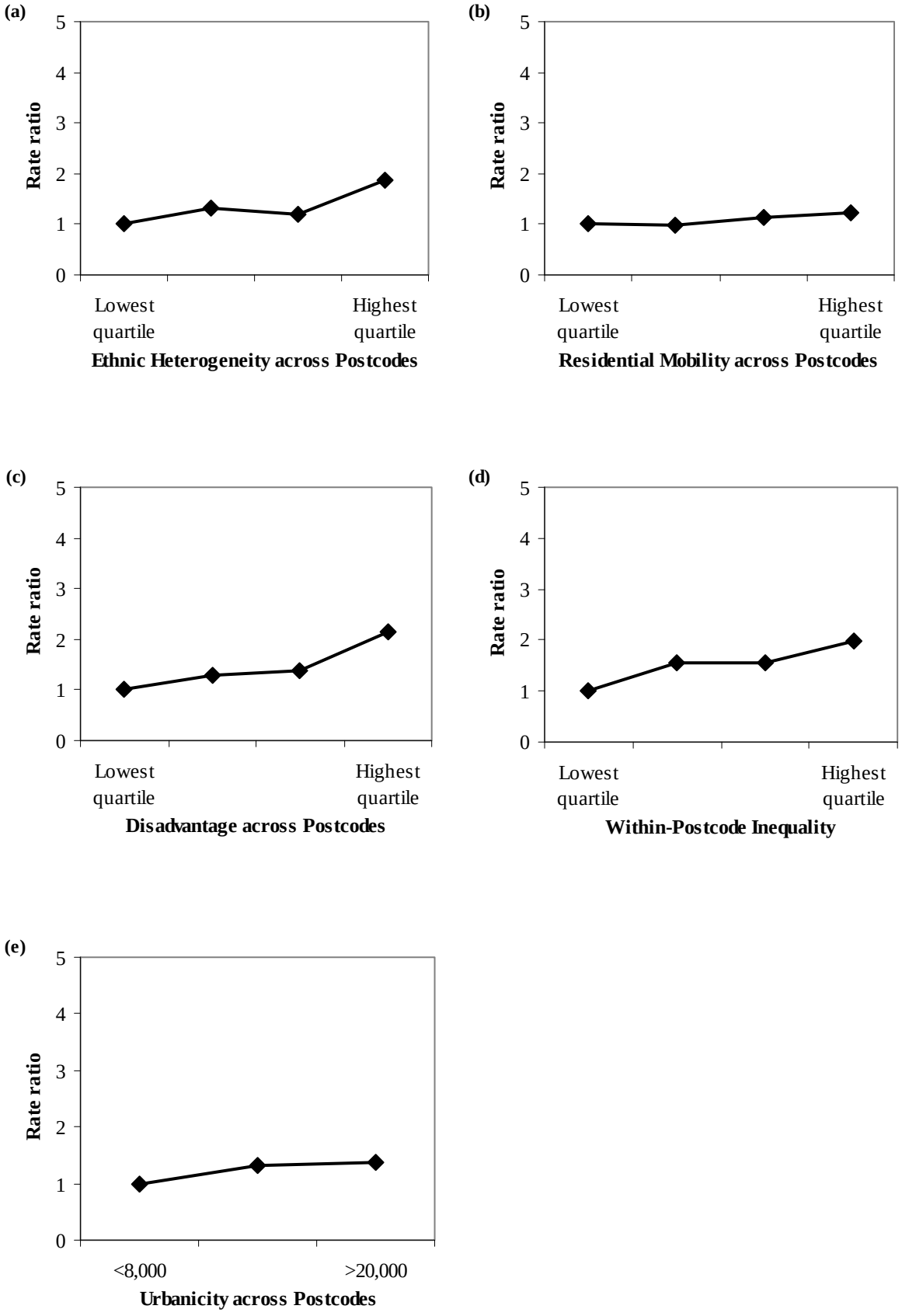
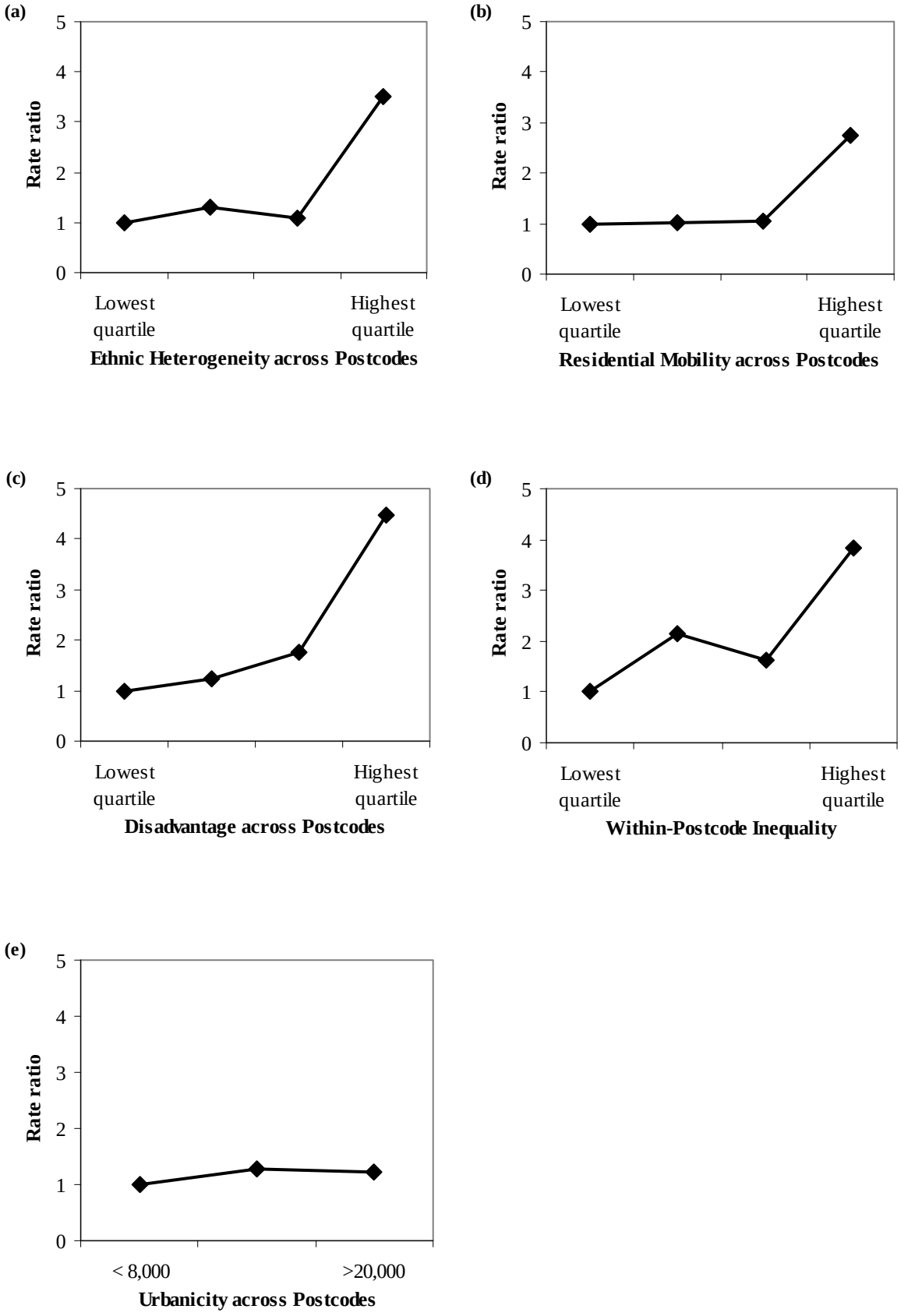


Figure 3: Rate ratios of the joint prevalence of schizophrenia diagnosis and arrest: 1985-96



DISCUSSION

The study has shown that socio-structural characteristics of postcodes are associated with the prevalence of (a) arrest, (b) schizophrenia diagnosis and (c) with the joint prevalence of schizophrenia diagnosis and arrest. One outcome of the research is the presentation of arrest prevalence over a 12-year period, in addition to prevalences (b) and (c). In the case of arrest, prevalence is typically examined in one-year periods. However, the examination of longer time periods reveals that a relatively large proportion of the population has some contact with police. For example research in the United Kingdom reveals that 33% of males and 9% of females born in 1953 have been convicted of an offence by the age of 46 (Prime et al 2001).

While the study shows that area-indicators are correlated with the prevalence of both schizophrenia and arrest, it is not in a position to determine whether the correlations are linked to real area-based generating mechanisms for crime or schizophrenia, or whether they result from variations in individual mechanisms Such analysis would require a simultaneous analysis of a full range of individual- and area- influences and is beyond the scope of the current study.

The study has been informed by the structural aspects of social disorganisation theory, but it was not able to test 'collective efficacy' aspects of modern versions of the theory. Nor was it designed to test the theory against other more specifically structural theories such as strain theory.

On the other hand, the study has shown that there is a greater need for services for those diagnosed with schizophrenia in areas which are socially disorganised. It is also of interest that the gradients of the social disorganisation indicators across postcodes are greater for arrest prevalence than they are for schizophrenia. It is well to bear in mind measurement issues when examining this issue. For schizophrenia there is always an acknowledgement that its treated prevalence will be a little lower than its true prevalence. For arrest the measurement issue is arguably more problematic. Taking one indicator as an example – urbanicity – there have been claims that crime is less likely to be reported to police in rural areas than in metropolitan areas, although solid Australian evidence on this issue is lacking. In Western Australia however, we know that, once a crime is reported to police, individuals are much more likely to be arrested in the regions outside of Perth than are in the metropolitan area. Research conducted at the University of Western Australia Crime Research Centre (Harding et al 1997) indicates that the ratio of arrest prevalence to reported crime in non-metropolitan regions is approximately double the same ratio for Perth. Furthermore the ratio of police to citizens is lower in the metropolitan area than it is outside of it. This means that patterns of arrest do not necessarily correlate well with patterns of offending. A similar distortion of arrest patterns has also been suggested with respect to the mentally ill by comparison with other citizens (Robertson 1988). On balance, the results of this study may partially reflect the relative balance of police and mental health services.

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APPENDIX 1:

Population prevalence rates of arrest for Western Australian 1985-1996 per hundred thousand of total population for different offence categories

Ethnic Heterogeneity	**Against the person**	**Property**	**Drug**	**Traffic**	**Other**	**Total**	**Rate ratios**
1st quartile (lowest heterogeneity)	1,008	3,003	2,002	4,188	1,847	8,777	1.00
2nd quartile	1,463	4,350	2,212	4,180	2,327	10,137	1.16
3rd quartile	1,454	4,312	1,905	4,270	2,425	9,965	1.14
4th quartile (highest heterogeneity)	4,416	9,513	4,756	14,713	7,489	28,888	3.29
Residential mobility	**Against the person**	**Property**	**Drug**	**Traffic**	**Other**	**Total**	**Rate ratios**
1st quartile (lowest mobility)	1,666	4,783	1,923	4,286	2,648	10,392	1.00
2nd quartile	1,603	3,771	1,961	3,969	2,523	9,363	0.90
3rd quartile	1,574	4,282	2,680	4,376	2,785	10,901	1.05
4th quartile (highest mobility)	3,621	8,592	4,456	15,259	6,355	28,060	2.70
Disadvantage	**Against the person**	**Property**	**Drug**	**Traffic**	**Other**	**Total**	**Rate ratios**
1st quartile (highest disadvantage)	4,350	10,169	4,950	14,694	7,421	29,475	4.77
2nd quartile	1,945	4,957	2,624	5,873	3,128	12,736	2.06
3rd quartile	1,249	3,460	2,022	3,890	2,190	9,017	1.46
4th quartile (lowest disadvantage)	753	2,482	1,225	2,700	1,265	6,179	1.00
Inequality	**Against the person**	**Property**	**Drug**	**Traffic**	**Other**	**Total**	**Rate ratios**
1st quartile (lowest inequality)	1,209	2,927	1,840	4,353	2,110	8,789	1.00
2nd quartile	2,213	5,708	3,275	6,776	3,849	15,410	1.75
3rd quartile	1,881	4,770	1,958	4,096	2,770	10,567	1.20
4th quartile (highest inequality)	3,116	7,934	3,841	12,289	5,468	23,371	2.66
Urbanicity	**Against the person**	**Property**	**Drug**	**Traffic**	**Other**	**Total**	**Rate ratios**
Less than 8,000 people	3,540	5,468	4,283	8,991	5,956	18,839	1.00
Between 8,000 and 20,000 people	3,386	6,356	3,452	11,235	5,719	20,387	1.08
Over 20,000 people	1,795	5,228	2,448	6,259	3,034	13,470	0.72
TOTAL	*2,100*	*5,323*	*2,730*	*6,881*	*3,546*	*14,527*	

Appendix 2

Prevalence rates of schizophrenia diagnosis for Western Australian 1985-1996 per hundred thousand of population aged 15-54

Ethnic heterogeneity

Category	*Rate*	*Rate ratio*
1st quartile (lowest ethnic heterogeneity)	148.1	1.00
2nd quartile	197.6	1.33
3rd quartile	176.6	1.19
4th quartile (highest ethnic heterogeneity)	278.5	1.88

Residential mobility

Category	*Rate*	*Rate ratio*
1st quartile (lowest residential mobility)	185.7	1.00
2nd quartile	184.0	0.99
3rd quartile	209.3	1.13
4th quartile (highest residential mobility)	226.5	1.22

Disadvantage

Category	*Rate*	*Rate ratio*
1st quartile (high disadvantage)	296.6	2.14
2nd quartile	191.3	1.38
3rd quartile	176.5	1.27
4th quartile (low disadvantage)	138.6	1.00

Inequality

Category	*Rate*	*Rate ratio*
1st quartile (lowest inequality)	132.7	1.00
2nd quartile	205.3	1.55
3rd quartile	207.9	1.99
4th quartile (highest inequality)	263.6	1.99

Urbanicity

Category	*Rate*	*Rate ratio*
Less than 8,000 people	151.4	1.00
Between 8,000 and 20,000 people	198.8	1.31
Over 20,000 people	208.3	1.33

Grand Total	*201.0*

Appendix 3

Prevalence rates of arrest and schizophrenia diagnosis for Western Australian 1985-1996 per hundred thousand of total population

Ethnic heterogeneity

Category	*Rate*	*Rate ratio*
1st quartile (lowest ethnic heterogeneity)	60.9	1.00
2nd quartile	79.3	1.30
3rd quartile	67.0	1.10
4th quartile (highest ethnic heterogeneity)	212.8	3.50

Residential mobility

Category	*Rate*	*Rate ratio*
1st quartile (lowest residential mobility)	73.2	1.00
2nd quartile	75.5	1.03
3rd quartile	77.9	1.06
4th quartile (highest residential mobility)	200.1	2.73

Disadvantage

Category	*Rate*	*Rate ratio*
1st quartile (high disadvantage)	220.4	4.46
2nd quartile	86.2	1.75
3rd quartile	61.1	1.24
4th quartile (low disadvantage)	49.4	2.14

Inequality

Category	*Rate*	*Rate ratio*
1st quartile (lowest inequality)	49.2	1.00
2nd quartile	106.2	2.16
3rd quartile	79.31	1.61
4th quartile (highest inequality)	188.7	3.84

Urbanicity

Category	*Rate*	*Rate ratio*
Less than 8,000 people	88.5	1.00
Between 8,000 and 20,000 people	113.0	1.28
Over 20,000 people	107.7	1.22

Grand Total	*105.6*

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