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Continuity of contact with psychiatric services: immigrant and Australian-born patients

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Abstract *Background*: Under-representation of ethnic minority groups in psychiatric services has been widely reported in Western nations. The present study examined whether there were differences between immigrant and Australian-born patients in their maintenance of contact with a statewide psychiatric service system. *Methods*: Groups were selected on the empirical grounds that they are differently represented in this service system. Employing a form of case-control design, four groups of patients were compared: those born in Australia, the United Kingdom, Southern Europe, and South East/East Asia respectively (n = 79 for each). Groups were identically matched on sex, age, diagnosis (either schizophrenia or bipolar illness) and locality of service. The groups did not differ as to the timing of their first appearance in the 3-year period in which their psychiatric contact was examined. *Results*: Despite their different representation in the psychiatric service system, the four groups did not differ on measures of continuity of contact. Measures included number of contacts with mental health community services, number of admissions to inpatient wards, length of stay in hospital and the longest interval between any two successive service contacts. *Conclusions*: The commonly reported under-representation of immigrant groups in the psychiatric service system does not appear to be due to greater discontinuation of contact with services. If the assumption of equal community prevalence of disorder is made, then the observed under-representation may be due to differential rates of access to (that is, initial contact with) psychiatric services.

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Introduction

Since the publication of Odegaard's (1932) classic study comparing the psychiatric admission rates of Norwegian migrants in Minnesota with Norwegians in Norway and American-born Norwegians, many ethnic minority groups have been found to be under-represented in the psychiatric services of Western nations (e.g., McDonald and Steel 1997; Burnett et al. 1999; Vega et al. 1999). Three major hypotheses for under-representation, illustrated in Fig. 1, have been proposed. The hypotheses are:

1. Differential community prevalence of disorders treated by psychiatric services
2. Differential access to psychiatric services, and
3. Differential disengagement from psychiatric services.

In the Australian population that we studied, there appears to be parity in the community prevalence of mental illness across ethnic minority and Australian majority groups (McLennan 1997; Andrews et al. 1999). Differential access to services may be due to several non-mutually exclusive factors, including lack of knowledge about service availability (Fan 1999), different cultural interpretations of possible problems and solutions (Kleinman 1987; Baker and Bell 1999; Lin and Cheung 1999), different impacts of stigmatization of mental illness (Donovan 1984; Ng 1997; Panganamala and Plummer 1998; Van Hook 1999), culturally insensitive clinical practices (Flaskerud and Hu 1992; Minas et al. 1994; Russell et al. 1996) and different pathways to care or referral/primary care patterns (Commander et al. 1997a, b; Burnett et al. 1999). Culturally insensitive clinical services may also increase disengagement or 'dropping out' from psychiatric services (Flaskerud and Hu 1992; Sue and McKinney 1977).

For most ethnic minorities, the net effect of the above factors may be to increase their reluctance to initially gain access to psychiatric services (Lin et al. 1978, 1982) and the likelihood of their disengaging early once a service has been accessed (Sue et al. 1991). However, not

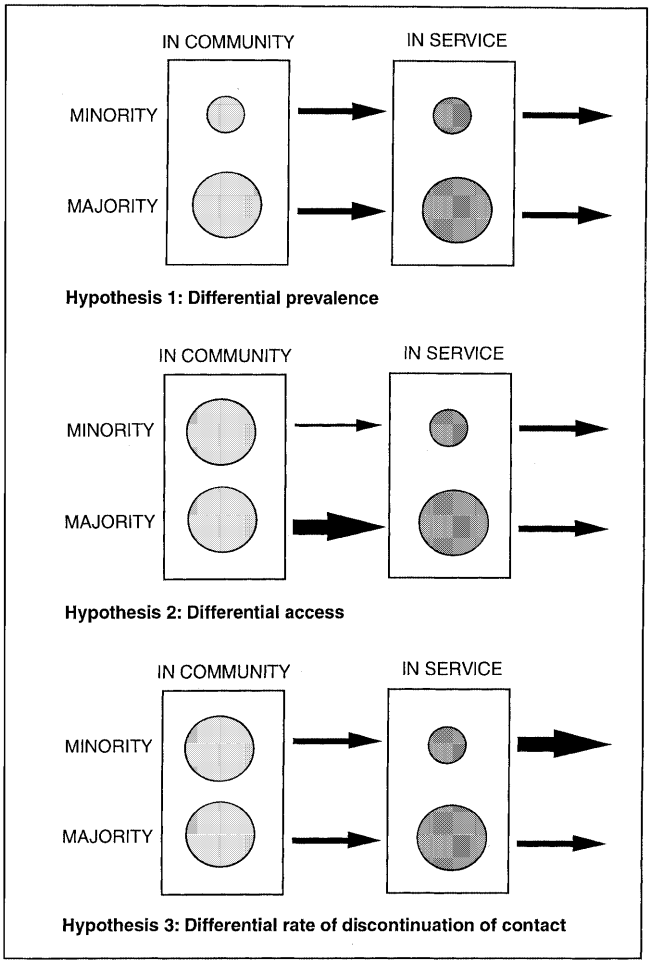

Fig. 1 Three hypotheses relating to under-representation of minority groups in the mental health service; i.e., differences in (1) prevalence, (2) access, (3) discontinuation (*circle* and *arrow* sizes represent relative proportion of people)

all results have been consistent with the above findings. For example, certain minority groups such as Francophones in Canada (Lefebvre et al. 1998) and Jewish-Americans in the USA (Yeung and Greenwald 1992) are more likely to seek treatment than are those belonging to the dominant national culture. On the other hand, other studies have found no differences between ethnic minority and majority groups in service use (e.g., Rosenheck and Fontana 1994).

The present study is concerned with differential disengagement from psychiatric services, and examines several indicators of continuity of contact measured in patients already in contact with the service system. Similar approaches have been adopted elsewhere to study continuity of care across different service systems (e.g., Sytema and Burgess 1999).

Continuity of contact

Measures of continuity of contact, such as the number of contacts with community psychiatric services and the number of admissions to inpatient wards, have been subject to various studies. Findings, summarized in Table 1, are inconsistent.

Evidence for under-representation

With regard to positive support for under-representation in the mental health system, Rosenthal and Frank (1958) found that ethnic minority patients made fewer outpatient visits than did Caucasian Americans. Karno (1966) found similar results, even when socioeconomic status was controlled for. Yamamoto et al. (1968) reported that a lower number of ethnic minority outpatients attended community mental health services ten or more times, when compared with Caucasian American patients[1]. More recently, Acosta (1979); Keefe and Casas (1980); Griffith (1985); Hough et al. (1987); Sussman et al. (1987); Olson and Klerman (1992); Gallo et al. (1995); Cooper-Patrick (1999) and Vega et al. (1999) found that ethnic minorities had far less contact with mental health services than did Caucasian Americans. Stuart et al. (1996) found that ethnic minorities, particularly those with a low familiarity with English, attended outpatient clinics less often than did the Australian born.

Sue and McKinney (1977) found that drop-out rates were significantly higher among immigrants and ethnic minority groups, compared to the white American population. Furthermore, in Great Britain, Gupta (1991), after matching subjects on age and date of first admission, found that Asian patients had significantly fewer subsequent admissions than white patients who were born in Britain. This finding is supported by Klimidis et al. (1999), who found, using data for the Australian state of Victoria, that patients born in non-English speaking countries had fewer admissions to inpatient wards in an annual period compared with patients born in Australia.

With regard to length of hospitalization, Gupta (1991) reported that Asian-born patients in Britain spent significantly less time in inpatient care compared with white patients born in Britain.

Evidence against under-representation

Other studies suggest that immigrant patients have similar patterns of ongoing service contact compared with patients born in the host country. For example, Flaskerud and Hu (1992) investigated whether ethnicity

[1] Yamamoto et al. (1968) did not perform any test of statistical significance. We reanalyzed his major findings by performing a Monte Carlo chi-square (Mehta 1994) test on the contingency table formed by ethnic group (Asian Americans, Black Americans, Caucasian Americans and Mexican Americans), collapsed across gender, by a binary variable (less than 10 visits versus 10 or more visits). We found the resulting chi-square to be statistically significant ($\chi^2 = 11.65$, $P < 0.01$), confirming Yamamato's et al. conclusions.

Table 1A, B Differences and similarities in continuity of contact indicators between ethnic minorities and the national majority group (+ indicates greater continuity of contact for the minority group compared to the majority group, – indicates greater continuity of contact for the majority compared to the minority group)

A Studies finding differences between ethnic minorities and the national majority

Studies	Country	Indicator
Rosenthal & Frank 1958	USA	No. of outpatient contacts (–)
Karno 1966	USA	No. of outpatient contacts (–)
Yamamoto 1968	USA	No. of outpatient contacts (–)
Sue & McKinney 1977	USA	No. of patient dropouts (–)
Acosta 1979	USA	No. of contacts (–)
Keefe & Casas 1980	USA	No. of contacts (–)
Griffith 1985	USA	No. of contacts (–)
Hough et al. 1987	USA	No. of contacts (–)
Sussman et al. 1987	USA	No. of contacts (–)
Gupta 1991	UK	No. of subsequent admissions (–)
Olson & Klerman 1992	USA	No. of contacts (–)
Crowley & Simmons 1992	UK	Length of hospitalization (+)
Flaskerud & Hu 1992	USA	No. of contacts (+)
Gallo et al. 1995	USA	No. of contacts (–)
Trauer 1995	Australia	Length of hospitalization (+)
Stuart et al. 1996	Australia	No. of outpatient contacts (–)
Burnett et al. 1999	UK	No. of subsequent admissions (+)
Copper-Patrick et al. 1999	USA	No. of contacts (–)
Klimidis et al. 1999	Australia	No. of total admissions (–); Length of hospitalization (+)
Vega et al. 1999	USA	No. of contacts (–)

B Studies finding no differences between ethnic minorities and the national majority

Studies	Country	Indicator
Shalkh 1985	UK	Length of hospitalization
Snowden et al. 1989	USA	Dropouts; No. of service contacts
Sue et al. 1991	USA	No. of sessions
Padgett et al. 1994	USA	No. of admissions, length of hospitalization
Wijesinghe & Clancy 1991	Australia	No. of admissions, length of hospitalization
McDonald & Steel 1997	Australia	No. of contacts
Stolk 1996	Australia	Length of hospitalization
Klimidis et al. 1999	Australia	No. of outpatient contacts

had an effect on a number of different outcomes, including the number of service contacts (which included both inpatient and outpatient contacts). After statistically controlling for sex, age, socioeconomic status, language spoken and diagnosis, it was found that ethnicity did not have a significant effect on the number of service contacts. However, statistically controlling for the effect of language spoken may have reduced any effect of ethnicity, as the two variables are of course correlated. Indeed, direct examination of ethnicity effects indicated that Asian-born patients had a higher number of contacts compared with white American patients. Similarly, patients who spoke English as their primary language had fewer sessions than the rest of the sample. Clearly, these results contradict the ones reported above. In addition, Sue et al. (1991) reported no differences between white American and minority group psychiatric patients as to the mean number of sessions attended. Shaikh (1985) matched Asian and British-born patients on age and sex and found no differences in length of hospital stay between the two groups.

After controlling for demographic variables such as age, sex, education and marital status, Snowden et al. (1989) found no difference in the number of services received by Black and non-Black patients at a Black community health center. In a similar vein, Flaskerud (1986) found that locating agencies in areas with a high proportion of ethnic minorities, as well as matching therapists to clients on the basis of ethnicity and language, increased outpatient contacts and reduced dropout levels (see also Bhui et al. 1995 and Takeuchi et al. 1995).

Klimidis et al. (1999) reported that there was no significant difference between patients born in Australia and patients born in non-English speaking countries in the mean number of contacts with community mental health services (although significant differences had been found at the inpatient level). Similarly, after statistically adjusting for geographical sector of the service, age, sex and diagnosis, McDonald and Steel (1997) found no significant differences between Australian-born patients and immigrant patients in the number of occasions on which community mental health services were accessed. An earlier study, by Wijesinghe and Clancy (1991), found no significant differences between Australian-born and immigrants with schizophrenia in number of psychiatric admissions. It should be noted, however, that this study did not control for age, sex or other variables that are thought to influence service contact.

Limiting the analysis to admissions in the Western region of Melbourne (where there is a high concentration of those of low socioeconomic status, Healy 1998), Stolk (1996) found that there were no significant differences in mean length of stay between patients born in English speaking countries and those born in non-English speaking countries. Similar results for the same geographical area had been reported earlier by Wijesinghe and Clancy (1991). In the American context, Padgett et al. (1994) found no significant differences in length of stay (or probability of hospitalization) between Caucasian, Black and Hispanic patients.

Finally, some studies have reported evidence of over-representation by ethnic groups in use of psychiatric services. For example, Crowley and Simmons (1992) reported that patients born in West Africa and the Caribbean spent significantly more time in inpatient care than did white patients born in Great Britain. Similarly, Klimidis et al. (1999) reported that patients born in non-English speaking countries spend a longer mean time in inpatient care than do Australian-born patients, with a similar result (using medians) reported earlier by Trauer (1995).

The present study

The discrepancies between the above results could be due to differences between the groups that were compared, and/or the use of inappropriate statistical tests. To overcome this we use a case-matching design to match the immigrant and majority groups on salient variables and employ non-parametric as well as parametric statistical analyses. Here, we examine groups that have been shown elsewhere (Bruxner et al. 1997; McDonald and Steel 1997; Klimidis et al. 1999) to have different representation in the Australian mental health service. Respectively, those born in Australia, Southern Europe, the United Kingdom and South East Asia/East Asia have been found to be progressively more weakly represented in this service system. The key question is whether, once groups are matched on sex, age, diagnosis and locality of service, they will differ on indicators of continuity of contact with psychiatric services. Prior to examining this issue, we test whether the differential representation of these groups in the mental health system as observed through previous analyses can be confirmed with the present data.

Subjects and methods

Selection of birthplace groups

We selected four birthplace groups for comparison on the basis of prior knowledge that they have progressively weaker representation in Australian psychiatric services (McDonald and Steel 1997; Klimidis et al. 1999); respectively, those born in Australia, Southern Europe (including Italy, Greece, former Yugoslavia and Cyprus), the United Kingdom (including England, Scotland, Wales and Northern Ireland) and South East Asia/East Asia (including Vietnam, China, Hong Kong, the Philippines, Singapore, Thailand, Indonesia, Malaysia, Cambodia and Burma/Myanmar).

For the Australian state of New South Wales, McDonald and Steel (1997) reported the "relative likelihood ratio" of psychiatric hospital separations and occasions of service with community psychiatric services. Calculations made from their data (McDonald and Steel 1997, Table C6, p. 289) indicated the following inpatient and community/outpatient relative ratios, respectively: Australia, 1.14 and 1.16; Southern Europe, 0.72, and 0.82; the United Kingdom, 0.71 and 0.36; and, South East Asia/East Asia, 0.37 and 0.43. Similar trends were evident in Klimidis et al. (1999) for the state of Victoria. Together, New South Wales and Victoria contain 62% of the immigrant population of Australia. Bruxner et al. (1997), in analyzing data from Western Australia, also provides partial support for the selection of these groups. Below (in the Results section) we examine whether this pattern holds true for our own 3-year Victorian data.

Data source

The data used in the study were from the Psychiatric Records Information Systems Manager (PRISM), also known as the Victorian Psychiatric Case Register. Data are routinely collected as part of the mental health service provision, and stored in this database. The data we analyze below were collected for the period from 1 July 1993 to 30 June 1996.

Subjects

The final sample consisted of 316 subjects, with 79 subjects in each birthplace group. Subjects across groups were identically matched on sex, diagnosis (bipolar, $n = 19$, and schizophrenia, $n = 60$, in each group), health service region (which co-varies with socioeconomic status in Melbourne as it does in many other cities, see Healy 1998) and age group.

Age was categorized using intervals of 5 years. Diagnosis was originally made using the ICD-9 classification system. Diagnoses were re-categorized so as to conform to the DSM-IV categories of schizophrenia and bipolar disorder. For each patient, the last diagnosis recorded in the database was taken to be the diagnosis for that patient. In order to simplify the analysis, only patients diagnosed with schizophrenia or bipolar disorder were included. Examination of the Victorian Psychiatric Case Register over a 3-year period (1993–1996) indicated that these diagnoses represent 44% of the diagnoses made, excluding cases where a diagnosis was not recorded.

Although the use of age categories meant that patients were not matched perfectly for age, analysis of variance (ANOVA) revealed that there were no significant differences in actual age (as opposed to age category) between the four groups [$F(3, 312) < 1$, ns]. There were 76 patients diagnosed with bipolar disorder and 240 diagnosed with schizophrenia. There was a total of 140 female and 176 male subjects, with 35 female and 44 male subjects in each ethnic group.

Although we did not actively control for this, there was no significant difference between the four ethnic groups as to the year in which patients were first identified in the database [$\chi^2(6) = 6.93$, ns]. Thus, the opportunity for service contact within the 3-year period of measurement was not different between the birthplace groups.

Power analysis

Given that sample sizes were limited by the number of available cases in the 3-year period of measurement, it was important to determine the ability of the design to detect differences between groups. Power analysis, based on a one-way ANOVA design with four groups, using GPOWER (Erdfelder et al. 1996) indicated that a medium effect size (difference in group means equal to half a standard deviation, Cohen 1988), a significance level (α) of 0.05 and a power of 0.8, would require at least 45 subjects per group, compared with our 79 subjects per group.

Variable selection and data transformation

The indicators of continuity of contact with the psychiatric service were:

1. The number of contacts with community psychiatric services
2. The number of admissions to inpatient wards (i.e., including re-admissions)
3. The longest period between contacts with any part of the service system (in days)
4. The total duration (in days), across all admissions, of hospitalization, during the 3-year period of measurement

The predictor variables analyzed comprised the following:

1. Birthplace group
2. Sex
3. Age (raw number of years or binary 'older' versus 'younger')
4. Region of health service

For regression analyses (see below), birthplace was represented by three 'dummy' variables coding any particular birthplace group (United Kingdom, Southeast/East Asia, Southern Europe) with one code and all other groups with another. A similar strategy was adopted for the health regions variable (Northern Metro, Eastern Metro and Southern Metro). Note that, in such coding, a full account of the contrasts is given by $K-1$ 'dummy' variables, where K is the number of categories in the original variable.

Initial exploration of the dependent variables revealed that their distributions differed significantly from normality. All were highly positively skewed, with high kurtosis ('peakedness') values. Log transformations were used in a preliminary attempt to normalize the distributions (e.g., Creed 1997; Handrinos et al. 1998). Normality was assessed using D'Agostino et al.'s (1990) test for normality of skewness and kurtosis, implemented in the Stata SKTEST (Stata Corporation 1997) procedure. Although the raw number of admissions was significantly non-normal, the SKTEST procedure found the log transformation for this variable to be successful in achieving normality. The SKTEST procedure applied to length of hospitalization indicated that the raw and log-transformed variables were significantly non-normal, as were the raw and log-transformed number of contacts and mean longest time between successive contacts.

Consequently, the Stata BOXCOX (Box and Cox 1964; Stata Corporation 1997) procedure was applied to the data in order to suggest an appropriate transformation, resulting in the following formula:

$$\frac{X^A - 1}{A}$$

where X is the raw value on the variable, and A is -0.13 for length of stay, 0.18 for number of contacts and 0.24 for longest time between any two successive contacts. Although the transformed number of contacts was still significantly non-normal, it appeared to be the best transformation available, and so was retained. The other two transformed variables did not differ significantly from normality. Data transformation is both commonly employed in, and recommended for, applied research (Kingman and Zion 1994). Nevertheless, the use of data transformation is somewhat controversial, as it may make interpretation of the results difficult and or lead to a reduction in statistical power, when compared with standard parametric and non-parametric tests (Kingman and Zion 1994).

Analyses of continuity of contact

The birthplace groups were matched only for the purposes of the study. As groups are 'artificially' paired (David and Gunnink 1997), this violates the assumptions of matched-sample statistical tests. Therefore, standard parametric and non-parametric independent group techniques were employed, including ANOVA, the Kruskal-Wallis test and the χ^2 test.

ANOVA was used to assess the influence of birthplace on all four measures of service contact. In order to maximize cell sizes, age was dichotomized, grouping those aged up to 40 years as the 'younger' group and above 40 years as the 'older' group. This resulted in there being 160 subjects in the younger group and 156 subjects in the older group. ANOVAs were conducted on both the raw and transformed variables. Sex, age and locality of health service were analyzed in addition to birthplace in order to explore any possible interactions between these variables and birthplace. Preliminary examination of the data indicated that it was only possible to analyze one three-way interaction; the effect of birthplace by sex by age, if all cell sizes were required to be 'sufficiently large' (this was arbitrarily defined here as having ten or more patients per cell). However, cell numbers were large enough to analyze all two-way interactions involving birthplace, these interactions being birthplace by sex, birthplace by age and birthplace by region of health service.

In addition to the analyses of transformed data, non-parametric statistics were also employed. Specifically, the Kruskal-Wallis (Siegel and Castellan 1988) test, a non-parametric analog of one-way ANOVA, was used to investigate differences between birthplace groups on admissions, contacts, length of hospitalization and period between service contacts. In the case of number of admissions which are not distributed normally (McKenzie et al. 1998; Ruef et al. 1998), observed frequencies did not differ significantly [$\chi^2(18) = 9.15$, ns] from the expected negative binomial frequencies (mean of 2.97 and a dispersion parameter of zero), as estimated using Stata NBREG (Stata Corporation 1997). The distribution of the data was also not significantly different from a Poisson distribution, according to the likelihood ratio χ^2 test [$\chi^2(1) = 0.13$, ns]. We chose to analyze number of admissions using the simpler, one parameter, Poisson distribution employed through the Stata POISSON procedure (Stata Corporation 1997). The Poisson mean was 2.97.

Results

Confirmation of group selection

Using the 3-year database, it was possible to discern the rates of inpatient and community services representation of the four groups chosen for comparison. This analysis focused on the number of patients at each service (inpatient or community services) per 100,000 head of the reference birthplace population. 'Number of patients' rather than the number of service contacts or admissions was used here (cf. McDonald and Steel 1997) to index differential representation across the birthplace groups. This removes the potential confounding of 'repeated use' of the service system (which is the principal focus of our analysis below) with group representation in the service system, both of which may differ independently between birthplace groups.

Figure 2 shows these rates along with their 95% confidence intervals, calculated by the Stata CI procedure (Stata Corporation 1997) using the methods reviewed by Armitage and Berry (1994) and McKenzie et al. (1997). As evident from this Figure, with respect to the inpatient setting, all immigrant groups were significantly under-represented when compared with the Australian born. In addition the Southern European group appears to have significantly higher levels of representation than the South East Asian/East Asian group. Tests of the group differences using 'exact' χ^2 (Mehta 1994) showed that all rates were significantly lower for immigrant groups relative to the Australian

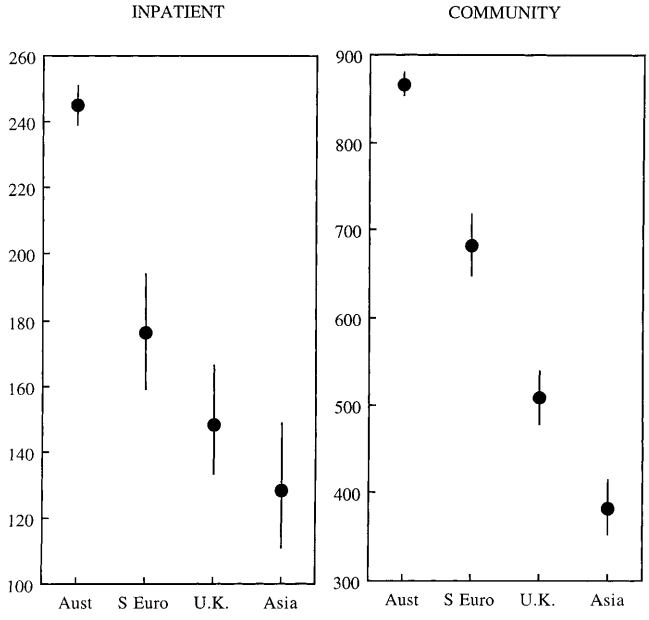

Fig. 2. Rates of representation of the selected groups in the mental health service system of Victoria (patients per 100,000 head of population) shown together with exact binomial 95% confidence intervals (*Aust* Australia, *S Euro* Southern Europe)

sample rate [respectively, for Southern Europe, United Kingdom and South East/East Asia, $\chi^2(1) = 29.77$, $P < 0.001$, $\chi^2(1) = 91.49$, $P < 0.001$, $\chi^2(1) = 79.32$, $P < 0.001$]. In addition, the rate for Southern Europe was significantly higher than that for the United Kingdom [$\chi^2(1) = 12.10$, $P < 0.001$]. The difference between the Southern Europe group and the South East/East Asia group was also significant statistically [$\chi^2(1) = 17.04$, $P < 0.001$], but no significant difference was found in relation to the rate comparison between the United Kingdom and the South East/East Asia group [$\chi^2(1) = 1.22$, ns]. With respect to outpatient/community rates, none of the 95% confidence intervals overlap each other, indicating that the group rates are significantly different from each other at the 0.05 significance level. For the sake of completion, we report the relevant statistical contrasts. The Australian rate compared, respectively, with those of Southern Europe, United Kingdom and South East/East Asia groups revealed the following outcomes: $\chi^2(1) = 53.35$, $P < 0.001$, $\chi^2(1) = 353.67$, $P < 0.001$, $\chi^2(1) = 387.52$, $P < 0.001$. Comparison of the Southern Europe group with the United Kingdom and South East/East Asia groups revealed the following outcomes: $\chi^2(1) = 94.50$, $P < 0.001$, $\chi^2(1) = 164.88$, $P < 0.001$. The rates for the remaining comparison between the United Kingdom and South East/East Asia groups were also significantly different [$\chi^2(1) = 21.24$, $P < 0.001$]. Thus, both inpatient and community/outpatient data suggest similar ranking of the groups according to their representation per head of population, and these Victorian findings, based on counting patients rather than episodes of service, agree with findings published previously (McDonald and Steel 1997).

Test of the continuity hypothesis

Mean values and standard deviations on the four continuity of care indicators are shown in Table 2, both in their raw form and their normal transform. ANOVAs on the raw and transformed variables, including number of admissions, number of contacts, length of stay as an inpatient and the longest time between successive contacts revealed that there were no significant main effects of birthplace, nor were there any significant two- or three-way interactions between birthplace, sex, age and locality of health service. There was also no significant effect of birthplace according to the Kruskal-Wallis test on the raw variables.

With regard to the Poisson regression on the number of admissions, none of the predictor variables was significantly associated with number of admissions, although the effect of having been born in the United Kingdom narrowly missed statistical significance, at the 0.05 level (i.e., $z = 1.94$, $P = 0.052$). The relative risk ratio (McNeil 1996) for being born in the United Kingdom (or not) was 1.21 (95% confidence inter-

Table 2 Mean and standard deviations of outcome variables for raw and normally transformed variables

	Australia		United Kingdom		SE Asia		Southern Europe	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Admissions								
Raw	1.66	1.46	2.22	2.40	1.71	1.31	1.84	1.40
Normalized	0.14	0.23	0.22	0.29	0.15	0.24	0.18	0.26
Contacts								
Raw	101.10	104.49	156.56	273.03	118.48	139.86	102.96	130.16
Normalized	4.95	3.22	5.05	3.04	4.84	2.18	5.12	2.78
Time as inpatient								
Raw	106.35	267.96	101.90	255.75	54.28	78.32	90.00	180.83
Normalized	2.58	1.02	2.65	0.94	2.66	0.76	2.72	0.81
Time between contacts								
Raw	154.87	148.15	166.68	206.04	145.13	131.44	136.17	152.82
Normalized	8.77	3.19	8.29	4.31	8.48	3.50	7.86	4.09

val = 1.00–1.47). Therefore, those born in the United Kingdom were found to be 1.21 times more likely to have been admitted relative to the remaining groups. This trend is also evident from visual inspection of Table 2. It should be noted that the effect size for the total model, the "pseudo-R^2" reported by the Poisson regression procedure was only 0.01. This indicates that only 1% of the variance in number of admissions was accounted for by the predictor variables, including the effect of birthplace groups, which is of most interest to the present report.

To summarise, under the present study conditions, using a number of statistical methods, the group differences that were expected based on known (and subsequently confirmed) representation differences in the psychiatric service system were not found in relation to measures of contact maintenance.

Discussion

The present study focused on hypothesis 3 from Fig. 1 and tested whether continuity of contact indicators are affected by the birthplace of patients. These birthplace groups were known to differ in their representation in the Australian psychiatric system (e.g., Bruxner et al. 1997; McDonald and Steel 1997; Klimidis et al. 1999), and this was confirmed by the present analysis. We matched the groups on key variables of diagnosis, sex, age and locality of service. In addition, the groups did not differ in their length of availability within the period of measurement, i.e., they did not differ in the timing of their first appearance within the 3-year observation period. It was expected that, relative to the Australian born, immigrant groups, particularly those from South East Asia/East Asia, the United Kingdom and Southern Europe, would have fewer contacts and admissions with psychiatric services in a given period of time, a briefer length of hospitalization (preferring early discharge where possible) and a greater period between any two successive contacts with psychiatric services. Despite this, the present study found that there were no significant differences between birthplace groups for any of the continuity of contact variables that were measured.

Statistical issues

Much care was taken to ensure that the tests of the predictions were fair and could not be attributed to lack of statistical power and misapplication of statistical tests to variables widely known (e.g., Marazzi et al. 1998; McKenzie et al. 1998) not to conform to assumptions of normality. Analyses included parametric tests on raw and transformed (normalized) data and their direct non-parametric analogs. In the case of number of admissions, the predictions were also examined by use of Poisson regression. Most of the other studies reviewed in Table 1 have not examined the distribution properties of variables and have not attempted to accommodate lack of normality. The present study failed to find any difference between groups regardless of the statistical methods used.

Contextual variance

Discrepancies exist between the findings of the present study and findings from some previous studies that have investigated continuity of contact with psychiatric services by immigrant patients. Such discrepancies may be due to investigating different ethnic immigrant or minority groups, different health systems, different sociocultural settings, and so on, when considering studies conducted in various countries and in various decades (e.g., Westermeyer 1989; Sytema and Burgess 1999). Many of the British studies, for example, have concerned themselves with health service utilization in relation to Caribbean immigrants (e.g., Crowley and Simmons 1992; Bebbington et al. 1994; Burnett et al. 1999), following on from earlier reports of a Caribbean over-representation in hospital-admitted populations. It is unclear to what extent useful cross-national generalizations can be made in relation to mental health services utilization by different immigrant groups. In addition, even within broadly similar sociocultural settings, there are discrepant results. For example, the results of studies by researchers in the United States, such as Yamamoto et al. (1968) and Sue and McKinney (1977), which found positive evidence of under-representation, have not been replicated by more recent work (e.g., Sue et al. 1991).

Methodological variance

Another possible reason for the discrepancy between results across studies may be due to differences in methodology. Several previous studies investigating maintenance of contact with psychiatric services did not control for heterogeneity among groups, either statistically or by design (e.g., Crowley and Simmons 1992; Trauer 1995; Stolk 1996; Klimidis et al. 1999). Significant differences between ethnic samples may have existed on a range of variables. For example, Gupta (1991) employed a case-matching approach, but matched groups on only two variables – age and date of first admission. Where demographic and diagnosis variables have not been controlled, it is possible that differences in maintenance of contact are not due to differential service use in different ethnic groups. Instead, such differences may be due to differential treatment on the basis of age, sex, diagnosis, service locality, and/or other variables. On the other hand, McDonald and Steel (1997) statistically controlled for the effects of age, sex, diagnosis and socioeconomic status, and found no significant differences between Australian-born patients and those born in non-English speaking countries in the mean number of contacts with services. The present study controlled

the effect of these same four variables by group matching and produced the same results as those reported by McDonald and Steel (1997). The advantage of the matching design used here is that it does not require statistical adjustment for the effects of demographic variables. Typically in statistical adjustment, linear regression is used to predict the effect of extraneous variables or covariates on the dependent variable. However, the actual relationships between variables may not be linear. It is, however, recognized that close matching, particularly on several variables simultaneously, may be difficult to achieve in practice.

The issue of diagnosis

The focus of the present study was on continuity of contact indicators in relation to patients with schizophrenia and bipolar disorder. The results may not, therefore, generalize to the management of other disorders. The present focus on these disorders was based on the expectation that they would represent a large pool of patients currently treated by the health system of Victoria which, according to policy, specifically targets those with 'serious mental illness' (Psychiatric Services Division 1994). Examination of 3 years of admission data indicated that 44% of admissions who had been given a diagnosis consisted of patients who suffered from schizophrenia or bipolar illness. One possible explanation for our results is that the system of care delivers clinical services inflexibly, regardless of differences in patient characteristics. If this were the case, it raises the issue as to whether treatment is structured optimally to meet the needs of patients with psychotic illness, or whether it is simply applied in a way that is invariant to the patient's needs. As our design does not involve a random allocation of patients to experimental conditions, we performed a preliminary examination by looking at the main effects of, and interactions between, the variables that were used to match the groups. Although sex, locality of service and patient's age were not related to any of the continuity of care measures, diagnosis was. Compared with bipolar patients, those with schizophrenia tended to have a higher number of community service contacts (mean 6.47, SD 2.95 vs mean 5.02, SD 2.72, $P < 0.05$). Although this effect was small, with only 1.6% of the variation in contact level being accounted for by the diagnostic difference, it does suggest that service provision varies according to diagnosis, and perhaps other patient characteristics not tested here, and that treatment delivery is responsive to patient characteristics.

While no significant differences could be found here between birthplace groups, other studies that have found different results may have done so because of the wider inclusion of patients with non-psychotic diagnoses. Accordingly, there might be a greater capacity to voluntarily withdraw from offered treatment in other disorders than is the case with psychoses. This would fit expectations that ethnic minority groups relate differently to the treatment service than do the majority group (Yamamoto et al. 1968; Sue and McKinney 1977; Gupta 1991; Crowley and Simmons 1992; Klimidis et al. 1999). It would be useful, therefore, to conduct similar analyses as conducted here with respect to disorders other than the 'functional psychoses', where treatment patterns and responses may be less constrained than for psychotic disorders.

Access to psychiatric services

The present findings indicate that there is adequate continuity of contact for immigrant patients in relation to both the inpatient population (mean number of admissions, length of stay, duration between contacts) and the outpatient sample (mean number of contacts). There appears to be no difference of any consequence between the ethnic groups studied in the continuity of mental health service utilization. The findings of the present study imply that under-representation in mental health services is likely to be a result of ethnic minority groups having a lower rate of access to services (Fig. 2, hypothesis 2) compared to the Australian born, with possible reasons for this being given earlier. This argument relies on there being parity in the community prevalence of mental illness across ethnic minority and majority groups (Fig. 2, hypothesis 1) (McLennan 1997; Andrews et al. 1999). Assuming that there is such parity, the present findings suggest that attention should be directed to improving access to services. Measures that result in improved access may be expected to address the problem of immigrant under-representation in mental health services.

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