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Prevalence and severity of substance use disorders and onset of psychosis in first-admission psychotic patients

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ABSTRACT

Background. Past studies have found inconsistent evidence that substance use disorders are related to earlier onset of schizophrenia or more severe symptoms. This study examines prevalence and severity of current substance use disorders and onset of psychotic illness in a multi-facility sample.

Methods. Data are from the Suffolk County Mental Health Project, an epidemiological study of first admission psychosis. The SCID and instruments measuring symptomatology, personality and background characteristics were administered. Respondents were stratified into three groups: (*a*) no life-time substance diagnosis; (*b*) in remission or reporting current mild use at admission; and (*c*) current moderate–severe substance abuse at admission.

Results. Using the SCID severity rating, 17·4% of males and 6·2% of the females had moderate or severe current substance abuse, while 41·5% of males and 68·2% of females had no lifetime substance diagnosis. In almost all cases categorized as moderate–severe, the substance diagnosis predated onset of psychosis. Females categorized as moderate–severe had an earlier age of onset of psychosis than did females in the other groups. There were only slight differences in symptom severity among the groups but more marked antisocial behaviour in the moderate–severe group. Variables discriminating the moderate–severe from non-abuse groups were BPRS thought disturbance, adult anti-social behaviour and current cigarette smoking for males and adult anti-social behaviour and child–teen antisocial behaviour for females.

Conclusions. Severity of substance abuse does not appear to be a pivotal correlate of the early features of psychotic illness.

INTRODUCTION

Since the 1970s the relationship between psychoactive substance use and the nature of psychotic episodes in psychiatric patients has been examined. The importance of this issue is underscored by findings that 58% of persons with non-affective psychosis had one or more lifetime substance use disorders (Kendler *et al.* 1996).

We located 20 studies that addressed the relationship of substance abuse/dependence to onset features (age, pre-morbid functioning, initial clinical presentation) of psychotic illness. Most studies dichotomized patients based on lifetime criteria for one or more substance use disorders rather than examining recency or severity of current use. Hence, the lifetime abuse/dependence samples included subjects whose substance use stopped long before the onset of psychosis along with patients with concurrent co-morbidity. Frequency of current use, where reported, ranged from none (Sevy *et al.* 1990) to all of those with a lifetime substance use disorder (DeQuardo *et al.* 1994). Except for one prospective study (Andreasson *et al.* 1989) and our preliminary analysis of a subset of the first admission sample analysed here (Kovasznay

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et al. 1993), the studies used a retrospective design, consecutive admissions, or patients recruited for clinical trials.

Overall, the studies produced few consistent differences between persons with and without substance use disorders. Five studies reported an earlier onset of schizophrenia among those with substance use disorders (Breakey *et al*. 1974; Tsuang *et al*. 1983; Pulver *et al*. 1989; Mueser *et al*. 1990; DeQuardo *et al*. 1994), but ten did not (Barbee *et al*. 1989; Bowers *et al*. 1990; Sevy *et al*. 1990; Cleghorn *et al*. 1991; Dixon *et al*. 1991; Kovasznay, 1991; Arndt *et al*. 1992; Peralta & Cuesta, 1992; Kovasznay *et al*. 1993; Swofford *et al*. 1996). Two (Seibyl *et al*. 1993; Lysaker *et al*. 1994) found age of onset differences only for those who used cocaine. All four studies (Breakey *et al*. 1974; Andreasson *et al*. 1989; Sevy *et al*. 1990; Linszen *et al*. 1994) examining the sequence of onsets of substance use disorders and psychosis found that substance use disorders occurred first. With four exceptions (Pulver *et al*. 1989; Kovasznay, 1991; Kovasznay *et al*. 1993; Seibyl *et al*. 1993), these findings were based on bivariate comparisons with no control for gender (Breakey *et al*. 1974; Barbee *et al*. 1989; Mueser *et al*. 1990; Sevy *et al*. 1990; Cleghorn *et al*. 1991; Dixon *et al*. 1991; Arndt *et al*. 1992; Peralta *et al*. 1992; DeQuardo *et al*. 1994; Lysaker *et al*. 1994), which is related to both substance use and age of onset of schizophrenia (Bromet *et al*. 1995). One study (Seibyl *et al*. 1993) of cocaine users found that about half started after onset of psychosis. Two studies (Breakey *et al*. 1974; Arndt *et al*. 1992) found that those with substance abuse disorders had better pre-morbid functioning, and one found no significant differences (Dixon *et al*. 1991).

Of the 16 studies that examined symptom severity, two found only small non-significant differences (Arndt *et al*. 1992; Seibyl *et al*. 1993), seven found significant differences on only a few symptom measures (Barbee *et al*. 1989; Mueser *et al*. 1990; Sevy *et al*. 1990; Dixon *et al*. 1991; Kovasznay, 1991; Peralta & Cuesta, 1992; Swofford *et al*. 1996) and seven found differences on more, but not all domains (Tsuang *et al*. 1983; Pulver *et al*. 1989; Cleghorn *et al*. 1991; Kovasznay *et al*. 1993; DeQuardo *et al*. 1994; Lysaker *et al*. 1994; Serper *et al*. 1995). These findings are consistent with research showing that substance use is not associated with most aspects of clinical course (Siris *et al*. 1988; Brady *et al*. 1990; Zisook *et al*. 1992). While three studies reported that substance-using patients had more hospitalizations (Drake *et al*. 1989; Brady *et al*. 1990; Swofford *et al*. 1996), it was unclear whether these hospitalizations were precipitated by drugs or psychosis. Two other studies did not find more hospitalizations among substance users (Seibyl *et al*. 1993; Lysaker *et al*. 1994).

The literature suggests that overall substance use disorders are at best only marginally related to onset and severity of psychotic illness. However, these studies contain a number of limitations: since they rely on lifetime diagnosis, the samples combine patients with severe and persistent substance use with those whose use is mild and remitting. Also, selecting consecutive admissions mean that the samples were not only heterogeneous (and potentially not comparable) with respect to illness course but also, to the extent that co-morbidity influences readmission patterns, created a bias toward over-inclusion of patients with co-morbid substance use disorders (Berkson, 1946) potentially obscuring its effects on illness onset.

This study examines prevalence and severity of substance use disorders and onset of psychosis in a multi-facility sample of first-admission patients with psychosis. In a preliminary analysis of a subset of respondents, we found no relationship between lifetime substance disorder and age of onset. However, those with lifetime co-morbid substance use disorder had elevated rates of depression and anxiety symptoms and prior suicide attempts compared to those without (Kovasznay *et al*. 1993).

The current report significantly extends this work in the full cohort by focusing on severity of substance use at the time of hospitalization and examining a more comprehensive set of onset characteristics, including antisocial behaviours and smoking. To distinguish respondents whose substance abuse had subsided prior to onset of their psychotic illness from those abusing substances around the time of onset, we created three groups: (*a*) no life time abuse or dependence; (*b*) full or partial remission (including mild current use) at the time of hospitalization; and (*c*) moderate or severe current abuse or dependence (including functional impairment and multiple symptoms). We focused particular

attention on groups (*a*) and (*c*), the groups believed to provide the sharpest contrasts. Specifically, we examined differences in age of onset, pre-morbid functioning, antisocial behaviours, and severity of psychotic and affective symptoms at hospitalization.

METHOD

Sample and procedure

The study design has been presented elsewhere (Bromet *et al*. 1992, 1996). Briefly, the sample ($N = 696$) was drawn from first psychotic admissions (ages 15 to 60) to one of the 12 psychiatric facilities in Suffolk County, New York, between September, 1989 and December 1995. Informed written consent was obtained from respondents. Inter-rater reliability on rating scales was moderate to excellent (Bromet *et al*. 1996).

Diagnosis

The present analysis focuses on 541 respondents with the following DSM-III-R consensus diagnoses (derived from all information including Structured Clinical Interview for DSM-III-R (SCID; Spitzer *et al*. 1992)): bipolar disorder with psychotic features ($N = 253$), major depressive disorder with psychotic features ($N = 99$), other non-organic psychoses ($N = 65$), schizophrenia spectrum ($N = 224$).

The diagnosis of substance abuse or dependence, age of onset of abuse/dependence and the severity rating (mild, moderate, severe, partial remission and full remission) were derived from the baseline SCID which included items from the National Household Survey on Drug Abuse (National Institute on Drug Abuse, 1988). Toxicology screening was not done consistently at time of admission. For the 70% with significant other interviews, the agreement (kappa) between respondent and significant other reports on substances was 0·60 for males and 0·48 for females. Thus, we used respondents' reports since their reported use was much greater.

Measures

Background, psychological and pre-morbid characteristics

This included age, gender, race, household socioeconomic status (blue *v*. white collar), education, marital status and pre-admission drug treatment (none *v*. any). Other measures included intelligence assessed with the Quick Test (Ammons & Ammons, 1962), Locus of Control of Behaviour Scale, measuring perception of control over problems and behaviours (Craig *et al*. 1984), and the Mini-Mental State Examination (MMSE) (Folstein *et al*. 1975).

The indicators of pre-morbid adjustment were the Global Assessment of Functioning (GAF) for the best month in the year prior to baseline interview; the Cannon-Spoor Pre-morbid Adjustment Scale administered at 6 month follow-up (Cannon-Spoor *et al*. 1982) that assessed social isolation, peer relationships, functioning outside the family, and school performance for ages 5–11, 12–15 and 16–18. Child–teen and adult antisocial behaviours and personality traits from the Structured Interview for Schizotypy (SIS) (Kendler *et al*. 1995); and pre-suicidal behaviour. We also created a composite measure of violence (none, some and a lot) from the Strauss–Carpenter Prognostic Scale (Strauss & Carpenter, 1974), the significant other interview, hospital discharge record and the SIS. None was defined as no evidence of violence from any source. Respondents with a lot of violence were those who were rated on the Prognostic Scale as frequently violent or who on the SIS endorsed more than one physical fight as an adult. Respondents not included in the 'none' or 'a lot' categories were assigned to the 'some' category.

Illness onset features

These were assessed with three variables from the baseline SCID: number of weeks from onset of psychosis to hospitalization, age of onset of first psychotic symptom, and severity of the precipitating event before onset of psychosis (rated from 1, 'no precipitant' to 5, 'catastrophic event'; DSM-III-R, Axis-IV).

Initial clinical presentation

This included five global ratings from the Scale for the Assessment of Negative Symptoms (SANS) (affective flattening, alogia, avolition–apathy, anhedonia–asociality and attention) and total score (Andreasen, 1981) and five global ratings from the Scale for the Assessment of Positive Symptoms (SAPS) (delusions, hallucinations, bizarre behaviour, formal thought dis-

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order, and inappropriate affect) and total score (Andreasen, 1984). Other symptoms were assessed with the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1961), including anxiety/depression, anergia, thought disturbance, activation/retardation, hostility/suspiciousness and the total symptom score (Woerner *et al*. 1988), and Hamilton Depression Scale subscale scores (anxiety and psychosis, weight loss, cognitive disturbance, diurnal, retardation and sleep disturbance) (Guy, 1976).

Analysis

Preliminary analyses indicated that: (*a*) males (58·5%) were significantly more likely to have a life time history of substance abuse or dependence than females (31·8%; $\chi^2 = 38{\cdot}3$, df = 1, $P < 0{\cdot}000$); (*b*) 60% of abuse/dependence respondents used multiple substances; (*c*) the number of substances was unrelated to premorbid and clinical history; and (*d*) the group of respondents with a life history of substance abuse/dependence was heterogeneous and included patients with no recent use or very mild use, as well as those with persistent, problematical use. To create homogeneous groups for the present analysis, we stratified the sample by gender and created three groups based on the categories provided by the SCID: (*a*) no life time abuse or dependence; (*b*) full or partial remission (including mild current use) at the time of hospitalization; and (*c*) moderate or severe current abuse or dependence (including functional impairment and multiple symptoms). Comparisons between the two extreme groups were performed using *t* tests for continuous variables and contingency table analysis for categorical variables for males and females separately. Modified Bonferonni correction was used to control for multiple comparisons by dividing 0·05 by the number of variables from each measure (for example six measures from the SANS were used, acceptable probability level was set at $P = 0{\cdot}008$, i.e. 0·05/6). To identify the variables that most strongly discriminated between the groups, we also performed logistic regression analyses, entering only those variables which were significant at the bivariate level. To test for interaction effects with diagnosis, a dummy variable of affective *versus* non-affective psychosis was entered into the logistic model.

To describe dose-related effects, we compared the three groups – no lifetime abuse, lifetime abuse/dependence with current mild or no use (remission), and lifetime abuse/dependence with current moderate–severe abuse. We report the means and standard deviations for these groups. Since we had no specific dosage model for either gender (i.e. that the remission–mild group would be half way between the no lifetime and moderate–severe current groups *v*. closer to one of the groups), monotonicity was used as a test of dosage effect, i.e. that the means for the remission–mild group would be between the other two groups.

RESULTS

Prevalence

Table 1 presents the prevalence of life-time substance use disorders by diagnostic group, gender and substance. Diagnostic and substance categories are ordered by prevalence. As seen the bipolar group had the highest prevalence of substance use disorders, followed by the major depressive group, the schizophrenia spectrum group and the other non-organic psychosis group. For any substance abuse disorder, the male:female prevalence ratios are respectively, bipolar 2:1, major depression disorder 1·6:1, schizophrenia 1·9:1 and other non-organic psychosis 2:1.

Males were more likely to have a current substance abuse disorder than females. The distribution for males and females on severity of substance use is as follows: no-life time abuse (41·5% ($N = 124$) *v*. 68·2% ($N = 165$)), full-remission (20·4% ($N = 61$) *v*. 14·9% ($N = 36$)), partial remission (12·7% ($N = 38$) *v*. 7·9% ($N = 19$)), mild abuse or dependence (8% ($N = 24$) *v*. 6·2% ($N = 7$)) and moderate–severe abuse or dependence (17·4% ($N = 52$) *v*. 6·2% ($N = 15$)).

Illness onset

Among females with current moderate–severe abuse/dependence, the age of onset of the first psychotic symptoms was 6 years younger than for females without a lifetime disorder ($24{\cdot}7 \pm 11{\cdot}0$, $N = 15$ *v*. $30{\cdot}8 \pm 10{\cdot}1$, $N = 160$; df = 173, $t = 2{\cdot}2$, $P = 0{\cdot}03$). There was also a clear linear trend with the remission and mild group being between the two groups ($28{\cdot}5 \pm 10{\cdot}1$). The onset curves for the three groups are shown in

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Table 1. *Prevalence of life-time substance use disorders by diagnosis, gender and substance (percentages)*

	Bipolar		Major depressive disorder		Schizophrenia spectrum		Other non-organic psychoses	
	Male $N = 76$	Female $N = 77$	Male $N = 48$	Female $N = 51$	Male $N = 146$	Female $N = 78$	Male $N = 29$	Female $N = 36$
Alcohol	66·7	30·7	53·2	31·4	47·1	18·9	37·0	14·7
Cannabis	48·7	21·6	19·1	16·0	37·5	15·8	25·9	8·8
Stimulants and cocaine	28·9	16·9	14·6	15·7	13·7	7·7	24·1	11·1
Hallucinogens	17·6	2·6	0	3·9	9·9	2·6	10·7	0
Sedatives	3·9	6·7	2·1	3·9	3·5	2·6	10·3	2·9
Opioids	5·3	1·3	2·1	3·9	2·8	3·9	3·4	2·9
Other and poly.	5·4	5·2	0	4·0	0·7	2·6	7·2	2·9
Any substance abuse disorder	72·4	37·7	56·3	35·3	54·8	29·5	44·8	22·2

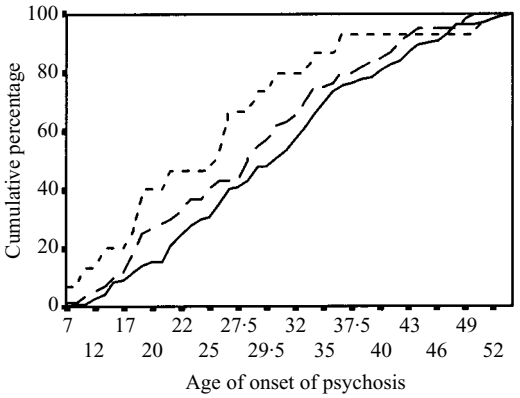

FIG. 1. Age of onset by severity of substance abuse or dependence at time of hospitalization for females. (Severity: ——, no life time (N = 160); – –, remission/mild (N = 60); ---, moderate/severe (N = 15).)

Fig. 1. The difference between the two extreme failure curves in Fig. 1 is significant (Breslow = 6·04, df = 1, $P = 0{\cdot}01$, Tarone–Ware = 5·13, df = 1, $P = 0{\cdot}01$, log rank = 3·4, df = 1, $P = 0{\cdot}06$). Since there were only 15 females in the moderate–severe group, comparisons within the diagnostic subgroups were not possible.

For males the age of onset of first psychotic symptoms was almost the same for the three substance use groups (non-abusers $25{\cdot}6 \pm 10{\cdot}0$, $N = 115$; remission–mild $26{\cdot}9 \pm 8{\cdot}9$, $N = 118$; moderate–severe $26{\cdot}4 \pm 8{\cdot}6$, $N = 49$, comparison of extreme groups $t = 0{\cdot}51$, df = 162, $P = 0{\cdot}58$). Analysis within diagnostic groups showed the same pattern.

Time from onset of psychotic symptoms until hospitalization was not significantly different among the substance use groups. Also there were no significant differences in the severity of the precipitating event of psychosis as rated on the SCID. To examine the temporal relationship of onset of substance abuse/dependence and onset of psychosis, the difference between these two ages was computed for the moderate–severe substance group. For users of multiple substances, the youngest (earliest) age of abuse or dependence was used to define this measure. Except for three males, all others began abusing substances prior to the onset of psychosis. For one of the three it was during the same year as onset of psychosis (mean $7{\cdot}5 \pm 6{\cdot}8$ years, median = 6, range −3 to 30). Three females began using substances prior to the onset of psychosis and 12 after the onset of psychosis (mean $3{\cdot}9 \pm 10{\cdot}2$ years, median = 5, range −20 to 18). Similar results were obtained when comparing onset of substance abuse and first manic episode for respondents with bipolar illness.

Background, psychological and pre-morbid characteristics

Table 2 presents the variables in this domain that significantly differentiated the moderate–severe group from non-abusers in either females or males. Aside from a trend for female substance abusers to be younger at time of first admission, none of the other demographic variables distinguished among the groups. No significant differences were found on intelligence or locus of control. The only background variable that was significantly different was receipt of substance abuse treatment (Table 2).

No significant differences between abusers and non-abusers were found on the items from the Cannon-Spoor measure of pre-morbid adjustment. Both male and female abusers were more likely to have made a suicide attempt in

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Table 2. *Relationship between selected pre-hospitalization characteristics and substance severity by gender in first admission with psychosis* (*only significant findings for at least one group presented*)

Characteristic present *v.* absent	Males Non-abuse Remission of mild Moderate or severe % (Numbers)	Females Non-abuse, Remission or mild Moderate or severe % (Numbers)
Previous treatment	2·4 (3/124)	0·6 (1/165)
Substance abuse treatment (Strauss–Carpenter)	17·9 (22/123)	16·1 (10/62)
	30·8 (16/52)	13·3 (2/15)
	OR = 17·9 (CI = 4·9–65·0)***	OR = 25·2 (CI = 2·1–29·7)***
Adult anti-social behaviour	66·0 (72/109)	56·5 (87/154)
Violence (some or a lot) (composite measure)†	75·2 (94/125)	72·0 (39/54)
	85·7 (42/49)	100 (13/13)
	OR = 5·4 (CI = 2·5–11·4)**	OR = 2·8 (CI = 0·90–8·9)
Global adult anti-social traits (SIS)‡§	12·5 (11/88)	4·7 (5/106)
	52·2 (48/92)	14·9 (7/47)
	67·6 (25/37)	33·3 (5/10)
	OR = 14·5 (CI = 5·7–37·1)***	OR = 20·2 (CI = 4·4–93·3)***
Global child–teen antisocial traits (SIS)‡§	21·7 (20/92)	11·1 (12/108)
	59·8 (55/92)	44·9 (22/49)
	60·5 (23/38)	50·0 (5/10)
	OR = 5·5 (CI = 2·4–12·5)***	OR = 8·0 (CI = 2·0–31·7)**
Other measures	15·4 (19/123)	26·9 (43/165)
Suicide attempt past 6 months (SCID)	27·9 (34/88)	30·6 (19/62)
	38·5 (20/52)	53·3 (8/15)
	OR = 3·4 (CI = 1·6–7·2)***	OR = 3·1 (CI = 1·1–9·1)*
Current smokers (SCID)	31·5 (39/124)	43·0 (71/165)
	63·4 (78/123)	62·9 (39/62)
	73·1 (38/52)	80·0 (12/15)
	OR = 5·9 (CI = 2·9–12·2)***	OR = 5·2 (CI = 1·4–19·3)**

OR = odds ratio; CI, confidence interval; comparisons of moderate/severe abusers to non-abuser.
*, $P < 0{\cdot}05$ (two-tailed); **, $P < 0{\cdot}01$; ***, $P < 0{\cdot}005$.
† Proportion 'some' to 'a lot' violent.
‡ Available from 6 month interview second part in which not all 6 months respondents participated.
§ Scale collapsed to normal (mild, absent) and pathological (marked, severe).

the last 6 months and to be smokers. Because of its relationship to substance abuse, a major focus of this study was on antisocial behaviour. As expected, the more severe the abuse, the greater the likelihood of this behaviour for both sexes.

Initial clinical presentation

For females the only symptom measure showing a significant difference between the non-abuse and the moderate–severe groups was the MMSE (no abuse = $26{\cdot}8 \pm 3{\cdot}2$, remission–mild = $27{\cdot}7 \pm 2{\cdot}1$ and moderate–severe = $27{\cdot}7 \pm 1{\cdot}1$; $t = 2{\cdot}3$ (no abuse *v.* moderate–severe), df = 173, $P = 0{\cdot}02$). In males, substance abuse was also significantly related to the MMSE (no abuse = $26{\cdot}7 \pm 2{\cdot}8$; remission–mild = $27{\cdot}2 \pm 2{\cdot}4$ and severe–moderate = $27{\cdot}6 \pm 1{\cdot}8$, $t = 2{\cdot}6$, df = 140, $P = 0{\cdot}01$) and to the BPRS total (no abuse = $38{\cdot}8 \pm 10{\cdot}1$, remission–mild = $42{\cdot}4 \pm 8{\cdot}3$ and severe–moderate = $43{\cdot}2 \pm 8{\cdot}4$; $t = 2{\cdot}7$, df = 168, $P = 0{\cdot}007$) and BPRS thought disturbance (no abuse = $2{\cdot}4 \pm 1{\cdot}1$, remission–mild = $2{\cdot}7 \pm 1{\cdot}1$ and severe–moderate = $2{\cdot}9 \pm 1{\cdot}1$; $t = 2{\cdot}9$, df = 172, $P = 0{\cdot}003$). However, the magnitude of these differences was not large. That is the BPRS total was 11% higher in the moderate–severe group *versus* non-abuse groups, the BPRS thought disturbances were in the very mild (2) to mild range (3) in both groups. The MMSE score was 3% higher for males and for females and there was little difference between the remission–mild and severe–moderate groups. There were no significant differences on the indicators of negative symptoms, positive symptoms or depressive symptoms.

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Best discriminating variables

A logistic regression was performed to identify which of the variables best discriminated between the moderate–severe and non-abuse groups. For males, it was BPRS thought disturbance (OR = 2·0, CI = 1·2–3·3), adult anti-social behaviour as measured on the SIS (OR = 17·5, CI = 4·9–62·5), and smoking (OR = 6·2, CI = 1·9–20). For females, it was adult anti-social behaviour (OR = 15·5, CI = 3·0–79·3) and global child–teen antisocial traits (OR = 5·6, CI = 1·2–27·0) both measured by the SIS. There were no significant interactions between the discriminating variables and diagnosis.

DISCUSSION

Overall, few significant differences were found between first admission psychotic persons who entered the hospital with moderate–severe current substance abuse or dependence compared with those without substance abuse. However, it was striking that almost all of those in the moderate–severe group had started their abuse or dependence several years prior to the onset of psychosis. For females current severe substance abuse or dependence was related to earlier onset of psychotic illness and for males and females, to more antisocial behaviour.

The higher rates of antisocial behaviours among substance abusers were consistent with findings from previous patient and non-patient studies and suggest that these differences are quite robust. The results regarding the relationship of substance abuse and gender and antisocial behaviour are not surprising.

The use of substances among psychotic persons has been variously seen as an attempt to self-medicate, a precursor or precipitant of psychosis or an unrelated phenomenon. Among these respondents who were recruited at first hospitalization, the results suggest that in females, substance use may have had some role as a precursor to onset of psychosis. This is suggested by our finding that age of onset of psychosis among substance abusing women was younger than the non-substance abusing women and that most of the respondents' first psychotic symptoms occurred many years after initiation of substance abuse, as other have noted (Linszen *et al*. Baigent *et al*. 1995; Strakowski *et al*. 1995). These differences in age of onset could be due to the earlier age of risk for substance abuse in general and the fact that these patients were selected at first admission for psychosis. As a result of this they were relatively close to age of onset of psychosis, but there was no selection for age of onset of substance abuse. It is thus possible that the earlier onset of substance abuse is in part a methodological artefact.

Among respondents with life-time substance disorders, 53·2% of females (41/77) and 65·1% (114/175) of males had current substance disorders. Among this group of current users, less than half (36·6% of females (15/41)) and 45·6% of males (52/114) were rated as moderate–severe in their abuse pattern at the time of admission to the hospital. While perhaps all substances abusing patients could benefit from substance abuse treatment, the reality is that resources are scarce. It should be noted that the group who are most in need of intervention within our population of first-admission psychosis were the 17% of males and 6·2% of females who were in the moderate/severe group at time of admission.

As compared to data from the National Comorbidity Survey (NCS) which had a similar age range, the current sample had higher prevalence rates of substance use disorder than non-psychotic respondents and similar rates to psychotic respondents. Lifetime prevalence for any DSM-III-R substance use disorder in NCS was 35·4% for males, 17·9% for females (Kessler *et al*. 1994) and among those respondents who met criteria for a non-affective psychosis, the rate of substance use disorder was 58·5% (Kendler *et al*. 1996). Among our respondents with non-affective psychosis the lifetime substance use disorder rate was 58·5% for males and 32·2% for females.

No causal model was stipulated in this research since the study lacked a control group and respondents were selected for inclusion based on having a psychotic illness and not based on having a substance abuse disorder. These constraints did not allow us to test the contribution of substance abuse alone or to compare the distribution of variables related to substance abuse in the current sample to a normal sample.

The limitations of the current analysis include that the data are primarily retrospective, and

dating time of onset of psychosis and substance abuse and dependence has known limitations. Also, our sample includes people hospitalized for psychosis after age 15. For younger respondents, the teen behaviour data reflect recent acts, whereas for older respondents, the data are more subject to retrospective bias or recall failure. Finally diagnoses were formulated with full knowledge of substance use histories. We used the SCID determination of substance use disorders rather than the psychiatrists' determinations to minimize bias that might have entered into the psychiatrists' formulations. Nevertheless, the two diagnoses cannot be viewed as independent.

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