Prevalence of Substance Abuse in Schizophrenia: Demographic and Clinical Correlates

by Kim T. Mueser, Paul R. Yarnold, Douglas F. Levinson, Hardeep Singh, Alan S. Bellack, Kimmy Kee, Randall L. Morrison, and Kashinath G. Yadalam

Abstract

Methodological issues involved in assessing the prevalence of substance abuse in schizophrenia are discussed, and previous research in this area is comprehensively reviewed. Many studies suffer from methodological shortcomings, including the lack of diagnostic rigor, adequate sample sizes, and simultaneous assessment of different types of substance abuse (e.g., stimulants, sedatives). In general, the evidence suggests that the prevalence of substance abuse in schizophrenia is comparable to that in the general population, with the possible exceptions of stimulant and hallucinogen abuse, which may be greater in patients with schizophrenia. Data are presented on the association of substance abuse with demographics, diagnosis, history of illness, and symptoms in 149 recently hospitalized *DSM-III-R* schizophrenic, schizophreniform, and schizoaffective disorder patients. Demographic characteristics were strong predictors of substance abuse, with gender, age, race, and socioeconomic status being most important. Stimulant abusers tended to have their first hospitalization at an earlier age and were more often diagnosed as having schizophrenia, but did not differ in their symptoms from nonabusers. A history of cannabis abuse was related to fewer symptoms and previous hospitalizations, suggesting that more socially competent patients were prone to cannabis use. The findings show that environmental factors may be important determinants of substance abuse among schizophrenic-spectrum patients and that clinical differences related to abuse vary with different types of drugs.

The prevalence of substance abuse in schizophrenia, as well as its influence on the etiology and course of the disorder, is an important but unstudied problem in clinical psychiatry. A wide range of different substances produce symptoms that mimic schizophrenia, but the influence of substance abuse on schizophrenia is controversial. Chronic alcohol abuse and withdrawal from alcohol can produce psychotic symptoms, including delusions and hallucinations (Victor and Hope 1958; Mott et al. 1965; Schuckit 1989), and have been hypothesized both to hasten the onset of schizophrenia (Freed 1975) and to mask its presence (Diethelm 1957; Parker et al. 1960; DeVito et al. 1970). Some schizophrenic patients report that drinking reduces their symptoms (Alpert and Silvers 1970; Hansell and Willis 1977), while others report the opposite (Kesselman et al. 1982; Schuckit 1983). Cannabis abuse can induce brief paranoid reactions, panic attacks, and mental confusion in persons with no prior psychiatric illness (Clark et al. 1970; Chopra and Smith 1974; Hollister 1986), and it has been reported to cause symptom exacerbations in schizophrenic subjects (Bernhardson and Gunne 1972; Treffert 1978; Knudsen and Vilmar 1984). According to medical lore, chronic cannabis use can lead to a psychotic state resembling schizophrenia (Chopra 1971; Thacore 1973), although the validity of this phenomenon has been questioned (Thacore and Shukla 1976; Ghodse 1986; Hollister 1986). Acute and chronic amphetamine challenge can

Reprint requests should be sent to Dr. K.T. Mueser, The Medical College of Pennsylvania at EPPI, 3200 Henry Ave., Philadelphia, PA 19129.

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cause paranoid ideation and hallucinations that can be indistinguishable from schizophrenia in previously unimpaired persons (Bell 1965; Hall et al. 1988). Amphetamine abuse has repeatedly been shown to worsen symptoms in some (Janowsky et al. 1973; West 1974; Janowsky and Davis 1976) but not all schizophrenic patients (van Kammen et al. 1982, 1985; Angrist et al. 1985; Lieberman et al. 1987). In addition, clinicians have reported successfully treating schizophrenic patients solely or adjunctively with amphetamines, especially patients with prominent negative symptoms (Wooley 1938; Davidoff and Reifenstein 1939; Angrist et al. 1980, 1982; Cesarec and Nyman 1985).

In the 1960's and 1970's, the youth counterculture revived the popularity of several psychoactive substances that had enjoyed wider use earlier in the century, including cannabis, amphetamines, cocaine, and narcotics. Hallucinogens such as *d*-lysergic acid diethylamide (LSD), methylene dioxymethamphetamine (MDA), mescaline, and psilocybin were also introduced into the recreational drug marketplace. The use of these substances was associated with psychopathological reactions including brief psychotic episodes (Hensala et al. 1967; Freedman 1968), schizophreniform psychoses (Bowers 1972, 1977; Bowers and Swigar 1983; Vardy and Kay 1983), and suicides (Cohen 1964, 1966).

The apparent increase in substance abuse by psychiatric patients has been particularly prominent among young patients with chronic mental illness, the majority of whom have schizophrenia (Pepper et al. 1981; Safer 1987). This is of special concern since substance abuse among young patients has been found to worsen the course of illness, increasing their risk of symptom exacerbations and rehospitalizations (Crowley et al. 1974; Carpenter et al. 1985; Safer 1987; Drake et al. 1989). To complicate matters further, "dual-diagnosis" patients tend to receive less outpatient treatment and to be more difficult to treat in the community, resulting in a poor prognosis (Solomon 1986; Solomon and Davis 1986).

Prevalence of Substance Abuse

To examine research on the prevalence of substance abuse in schizophrenia, a comprehensive methodological review of published studies in this area was conducted. The scope of the review was limited to studies examining either alcohol or illicit drug abuse in schizophrenia, excluding studies of caffeine or tobacco use (for a review, see Schneier and Siris 1987). Studies were included if they had at least 15 patients and if the specific number of patients in each diagnostic group who were and were not substance abusers was reported (or could be calculated). Finally, only those studies were included which examined abuse in a sample of patients who were not selected on the basis of a history of abuse (or lack thereof). Thus, studies comparing a fixed number of substance-abusing patients with a group of nonabusing patients drawn from a different sample were excluded, as were studies that failed to report the total number of patients assessed or those that focused solely on characteristics of substance-abusing psychiatric patients (e.g., Roy 1981; Vardy and Kay 1983; Hays and Aidroos 1986; Ross et al. 1988; Pulver et al. 1989).

Table 1 summarizes the research conducted on substance abuse in schizophrenia, including the methodological characteristics of each study. Studies on only alcohol are presented first, followed by studies examining specific classes of drug abuse (e.g., stimulants, cannabis), and finally by studies on unspecified classes of substance abuse. The relevance of each of the listed methodological issues to estimations of the prevalence of substance abuse in schizophrenia is discussed below.

Diagnosis of Patients. Accurate, reliable psychiatric diagnoses based on specific, widely accepted criteria are essential in assessing the prevalence of substance abuse in psychiatric populations. Diagnostic systems developed before the criteria of Feighner et al. (1972) had poor reliability (Spitzer and Fleiss 1974). Even with the use of operationally defined criteria (e.g., the Research Diagnostic Criteria [RDC] of Spitzer et al. [1978]), schizophrenia was less reliably diagnosed than other major psychiatric disorders (Helzer et al. 1977). Accurate diagnosis is critical to evaluating the psychopathological consequences of commonly abused substances such as alcohol, stimulants, and hallucinogens. A second aspect of diagnostic assessment is whether a structured interview was used to obtain information on symptoms and history of the illness. The failure to use a structured diagnostic interview increases information variance and the risk of misdiagnosis significantly (Alterman et al. 1984).

More than one-third (8 out of 22) of the studies reviewed did not specify which diagnostic criteria were used (table 1). Only three studies reported using standardized structured interviews in diagnosing

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patients (Siris et al. 1988; Ananth et al. 1989; Barbee et al. 1989).

Subject Characteristics. To evaluate whether the prevalence of substance abuse in schizophrenia differs from that in other psychiatric disorders or the general population, it is desirable to have a comparison group of subjects that is matched to the schizophrenic group on demographic characteristics. Gender, age, socioeconomic status, and race have all been found to be important factors of substance abuse in the general population (e.g., Smith 1989). If these variables are not controlled for when comparing diagnostic groups, differences in prevalence rates could be erroneously attributed to diagnostic rather than demographic factors.

Gender is a particularly important factor for both substance abuse and schizophrenia. There is overwhelming evidence that males are more prone to substance-abuse disorders than are females in the general population (Myers et al. 1984; Smith 1989). It has long been observed that females with schizophrenia tend to have a more benign course of the illness (Angermeyer and Kuhn 1988) and spend less time in psychiatric hospitals than males (Goldstein 1988). A result of these gender differences is that relatively more male than female schizophrenic subjects are treated in inpatient settings, where most studies of substance-abuse prevalence are conducted. A high male-to-female ratio in a sample of schizophrenic patients could result in higher estimates of substance abuse for this disorder.

Seven of the studies reviewed included only males or predominantly males, seven studies specified the number of male and female schizophrenic patients in the sample, and eight studies provided no information on the gender distribution of the schizophrenic sample. However, only three of the seven studies reporting the number of male and female schizophrenic patients presented data on substance abuse according to gender (Whitlock and Lowrey 1967; Negrete et al. 1986; Barbee et al. 1989). Few studies have examined the relationships between substance abuse and other demographic characteristics in schizophrenic patients (e.g., age, race, and socioeconomic status). These need to be explored to determine whether the same demographic factors that predispose nonpsychiatric patients to substance abuse are also associated with greater abuse among schizophrenic patients.

Hospital Setting. The setting where the study sample is obtained may have an important bearing on substance abuse prevalence estimates (Galanter et al. 1988). Estimates of the prevalence of abuse in schizophrenic patients requiring emergency treatment may be higher than estimates obtained from other settings (Atkinson 1973; Barbee et al. 1989) as has been found in nonpsychiatric patients requiring emergency treatment (e.g., Trier and Levy 1969; Atkinson 1973). The prevalence of substance abuse may also vary depending on whether the patients are inpatients or outpatients and on the chronicity of illness. Some research has suggested that more severely ill psychiatric patients are less likely to be substance abusers (or "heavy" abusers) than less ill patients (Cohen and Klein 1970; Ritzler et al. 1977; O'Farrell et al. 1983). However, this suggestion is not supported by the differences in abuse between acute and chronic inpatients found in the studies reviewed (table 1). Similarly, while schizophrenic patients in the Veterans Administration (VA) system tend to have better premorbid functioning than State hospital patients (Zigler and Levine 1973), there are no clear differences in abuse patterns between VA patients (Pokorny 1965; McLellan and Druley 1977; Alterman et al. 1981; O'Farrell et al. 1983; Magliozzi et al. 1983) and others.

Definition of Substance Abuse. Accurate measurement of substance abuse is a difficult problem for all populations (Nirenberg and Maisto 1987; Donovon and Marlatt 1988). Definitions of substance abuse vary from simple "use" of a psychoactive substance to "abuse" or "dependence." Abuse generally refers to the repeated use of a substance to the extent that it interferes with adequate social, vocational, or self-care functioning. Dependence refers to the development of tolerance to a substance such that the person requires larger dosages to achieve the same psychoactive effect, and the experience of withdrawal symptoms and craving after a period of abstinence from the substance (*DSM-III-R;* American Psychiatric Association 1987). In practice, substance abuse and dependence are often difficult to distinguish from each other, particularly for cannabis and hallucinogen use, for which tolerance and a clear pattern of withdrawal symptoms have not been established. With psychiatric patients, whose everyday functioning is impaired by their illness, the distinction between substance use and abuse is also difficult to make, since the relative influence of psychiatric illness and substance abuse on current functioning is cloudy.

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Table 1. Epidemiological studies of substance abuse in schizophrenia

Study	Diagnostic[1] criteria	Subjects[2]	Hospital[3] setting	Definition[4] of abuse	Duration[5] of abuse	Alcohol
Alcohol only studies						
Parker et al. (1960)	Lewis & Piotrowski (1954)	S:150(M) MD:70(M) D:100(M)	AI	A	Life	S:22.0 MD:32.8 D:20.0
Pokorny (1965)	?	S:89(M)[7] MD:20(M) P:44(M) N:84(M) OBS:18(M)	AI/ VA	A	Life	S:15.7 MD:15.0 P:19.0 N:25.0 OBS:0
Alterman et al. (1981)	*DSM-II*	S:578(M) OBS:169(M) O:120(M)	CI/ VA	A	Life	S:12 3 OBS:21.9 O:19.2
O'Farrell et al. (1983)	?	S:207[8] A:37 OBS:40	CI/ VA	A	Life	S:23.0 A:63.0 OBS:35.0
Bernadt & Murray (1986)	RDC	S:57 SA:16 D:34 M:30 MJD:69 O:86 OC:16	AI	A/ MHDS	Past year	S:8.8 SA:6.3 D:20.6 M:20.0 MJD:11.6 O:7.0 OC:6.3
Alcohol/drug abuse studies						
Rockwell & Ostwald (1968)	?	S:86(M)[9]	CI	A[10]	Current	
Cohen & Klein (1970)	Klein (1967)	S:24 P:67	AI	A,D	Life	

See footnotes at end of table.

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	Percentage of subjects with substance abuse[a]					
	Stimulant	Sedative	Cannabis	Hallucinogen	Narcotics	Unspecified
	S:0[A]					
			S:12.5 (Abuse) P:10.4 (Abuse)			S:33.3 (Abuse) P:26.9 (Abuse) S:8.3 (Dependence) P:49.2 (Dependence)

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Table 1. Epidemiological studies of substance abuse in schizophrenia—*Continued*

Study	Diagnostic[1] criteria	Subjects[2]	Hospital[3] setting	Definition[4] of abuse	Duration[5] of abuse	Alcohol
Breakey et al. (1974)	Breakey & Goodell (1972)	S:28(M)[11] S:18(F) C:28(M) C:18(F)	AI	A	Life	
Hansell & Willis (1977)	Taylor & Abrams (1975)	S:276(M) S:299(F)	O	A[12]		
McLellan & Druley (1977)	?	S:141(M) D:87(M) O:60(M)	I/ VA	A	Life	S:14.2 D:17.2 0.15.0
Magliozzi et al. (1983)	*DSM-III*	S:57(M)	I/ VA	U[13]	Current	
Richard et al. (1985)	?	S:141 A:55 P:19	AI	U	Past 6 months	
Negrete et al. (1986)	ICD-9	S:82(M) S:55(F)	O	U[14]	Life, past 6 months	
Siris et al. (1988)	RDC[15]/ SADS	S/SA:24(M) S/SA:22(F)	O	A	Life	
Barbee et al. (1989)	*DSM-II*/ DIS	S:35(M) S:18(F)	ER	A,D/ DIS	Life	S:31.4(M)[16] (Abuse) S:27.8(F) (Abuse) S:42.8(M) (Dependence) S:27 8(F) (Dependence)

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Percentage of subjects with substance abuse[6]					
Stimulant	**Sedative**	**Cannabis**	**Hallucinogen**	**Narcotics**	**Unspecified**
S:15.0[A] C:6.5[A]		S:45.0[M] C:15.2[M] S:17 5[H] C:10.9[H]	S:20.0[L] C:8.7[L] S:2.5[ME] C:10.9[ME]		
S:4.5[A]					
S:11.3[A] D:2.3[A] 0:11.7[A]	S:3.5[B] D:13.8[B] O:10.0[B]		S:9.9 D:1.1 O:11.7	S:6.4 D:9.2 O:8 3	
		S:42.0 A:19.0 PTS:25.0			
S:23.1 A:3.6 P:15.8 S:15.4[C] A:1.8[C] P:0[C]					
		S:65.8(M) (Life) S:40.0(F) (Life) S:24.0(M) (6 months) S:9.1(F) (6 months)			
S:SA:13.0[A] S:SA:13.0[C]	S/SA:4.0	S/SA:35.0[M]	S/SA:11.0	S/SA:2.0	
S:11.3[A] S:3.4[C]	S:8.6[B] S:11.3[T]	S:35 8[M]	S:5.7	S:6.9	

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Table 1. Epidemiological studies of substance abuse in schizophrenia—*Continued*

Study	Diagnostic[1] criteria	Subjects[2]	Hospital[3] setting	Definition[4] of abuse	Duration[5] of abuse	Alcohol
Drake et al. (1989)	*DSM-II*	S.68(M) S:47(F)	O	U,A,D/ CPS	Past 6 months	S:7.0[17] (Abuse) S:14.8 (Dependence)
Unspecified substance abuse studies						
Whitlock & Lowrey (1967)	?	S:39(M)[19] S:44(F) MD:14(M) MD:45(F) D:24(M) D:57(F)	AI	D	Past month	
Atkinson (1973)	?	S:89 A 20 P:42 N:52 OBS:23 C:13	ER	A	Current	
Hall et al (1977)	RDC, NHSI	S.52 A:60 P.27 N:43	O	A[21]	Current	
Bowers & Swigar (1983)	*DSM-III*	S:17 SA:20 SP:21 M:24	AI	U[22]	Past 3 years	
Safer (1987)	?	S:35 O:33	O	A	Before 3 months ago (past) Past 3 months (recent)	

See footnotes at end of table.

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Percentage of subjects with substance abuse[a]					
Stimulant	Sedative	Cannabis	Hallucinogen	Narcotics	Unspecified
					S:33 9[18]
					S:2.6(M) S:6.8(F) MD:7.1(M) MD:17.7(F) D:4.2(M) D:26.3(F)
					S:29.2[20] A:20.0 P:40.5 N:40.4 OBS:17.4 C:30.8
					S:15.4 A:16.7 P:11.1 N:20.9
					S:64.7 SA:70.0 SP:66.7 M:54.0
					S:42.8 (Past) O:21.2 (Past) S:40.0 (Recent) O:12.1 (Recent)

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Table 1. Epidemiological studies of substance abuse in schizophrenia—*Continued*

Study	Diagnostic[1] criteria	Subjects[2]	Hospital[3] setting	Definition[4] of abuse	Duration[5] of abuse	Alcohol
Ananth et al. (1989)	*DSM-III*/ DIS	S:38 A:17 O:20	AI	A,D/[23] DIS	Life	

[1] Diagnostic criteria used/structured interview instrument: *DSM-II* = Diagnostic and Statistical Manual of Mental Disorders, 2nd ed. (American Psychiatric Association 1968); *DSM-III* = *Diagnostic and Statistical Manual of Mental Disorders*, 3rd ed. (American Psychiatric Association 1980); ICD-9 = International Classification of Diseases, 9th version (World Health Organization 1979); NHSI = New Haven Schizophrenia Index (Astrachan et al. 1972); RDC = Research Diagnostic Criteria (Spitzer et al. 1978)/DIS = Diagnostic Interview Schedule (Robins et al. 1981); SADS = Schedule for Affective Disorders and Schizophrenia (Endicott and Spitzer 1978).

[2] Number of subjects per diagnosis (sex of subject): A = affective disorder; C = nonpsychiatric controls; D = depression; M = mania; MD = manic-depression; MJD = major depression; N = neurosis; O = other psychiatric disorders; OBS = organic brain syndrome; OC = obsessive-compulsive disorder; P = personality disorder; PTS = posttraumatic stress disorder, S = schizophrenia; SA = schizoaffective disorder; SP = schizophreniform disorder. (F) = female; (M) = male.

[3] Patient setting where substance abuse was assessed: AI = acute inpatient unit; CI = chronic inpatient unit (over 3 months); ER = emergency room; I = inpatient ward; O = outpatient setting; VA = Veterans Administration hospital.

[4] Definitions of substance abuse/assessment instruments: A = abuse; D = dependence; U = use/DIS = Diagnostic Interview Schedule (Robins et al. 1981); CPS = NIMH Community Support Program Evaluation (McCarrick et al. 1985); MHDS = Manitoba Health and Drinking Survey (Murray 1978).

[5] Duration of substance use, abuse, or dependence (e.g., current, past 6 months, lifetime).

[6] The percentage of patients in each diagnostic group who abused a particular class of substance is given. ALC = alcohol; STI = stimulants (amphetamines [A], cocaine [C], and related compounds); SED = sedatives (anxiolytics, barbiturates [B], hypnotics, tranquilizers [T]); CAN = cannabis (hashish [H], marijuana [M], THC); HAL = hallucinogens (LSD [L], MDA, mescaline [M], phencyclidine, psilocybin); NAR = narcotics (codeine, heroin, morphine, opium); USP = unspecified.

[7] Combined sample of single admissions (n = 75), patients with 6 or more admissions (n = 77), and randomly selected patients (n = 85) over a 10- year period.

[8] Males constituted 94% of the total sample.

[9] Only the State hospital population is reported here. The specific number of schizophrenic patients assessed in the study of psychiatric and general hospital admissions was not described in the original article.

[10] Abuse determined by urine analysis using thin layer chromatography.

[11] Fourteen schizophrenic patients who had never used drugs were compared with 26 who had drug use before their illness developed. Three schizophrenic patients who used drugs only after the illness developed were dropped, as were 3 patients for whom it could not be determined whether drug abuse preceded onset of the illness (sex of dropped subjects was not specified).

[12] Abuse was defined as amphetamine-induced "subtle or dramatic exacerbations in the course of the illness" (Hansell & Willis 1977, p. 1085).

[13] Current cannabis abuse assessed by thin layer silica gel chromatography of urine samples performed on patients returning from day passes.

[14] Recent cannabis abuse was assessed by both interview and a cannabinoid assay performed on urine samples.

[15] All patients also met operationalized criteria for postpsychotic depression (Siris et al. 1981).

[16] Ratings of alcohol abuse and dependence were not mutually exclusive.

[17] Alcohol abuse was rated as "moderate" drinking; dependence was rated as "severe" or "extremely severe" drinking. Abuse and dependence were rated mutually exclusive of each other.

[18] Use of "street drugs" rated.

[19] S included S, SA, SP; MD included MD, MJD, hypomania.

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Percentage of subjects with substance abuse[6]					
Stimulant	Sedative	Cannabis	Hallucinogen	Narcotics	Unspecified
					S:36.8 (Abuse) A:52 9 (Abuse) O:10.0 (Abuse) S:36.8 (Dependence) A:29.4 (Dependence) O:50 0 (Dependence)

[20] Physicians' judgments of whether substance abuse played a "major factor" or "minor factor" in precipitating hospitalization were combined.
[21] Abuse of opiates, amphetamines, barbiturates, and methadone determined by thin layer chromotography, gas chromatographic analysis, and radioimmunoassay of urine samples.
[22] Examined use of amphetamines, cocaine, cannabis, and LSD using scale developed by Bowers (1977).
[23] Abuse and dependence were mutually exclusive of each other.

Several different strategies may be used to assess substance abuse, including interviews with patients, significant others, and laboratory testing for pharmacological substances. Few standardized instruments exist for obtaining information about substance abuse from patients or significant others (e.g., see Bernadt and Murray 1986; Ananth et al. 1989; Barbee et al. 1989; Drake et al. 1989). Both psychiatric patients and nonpatients often deny substance abuse even when there is clear evidence to the contrary (Rockwell and Ostwald 1968; Magliozzi et al. 1983; Aiken 1986). At the same time, significant others are often not privy to information about patients' substance abuse. Routine assays performed on urine and blood samples have limitations on the substances and quantities they detect, and they cannot determine the pattern and frequency of abuse. Only a few of the studies reviewed used urine tests, and these were aimed mainly at determining the prevalence of current substance abuse (Rockwell and Ostwald 1968; Hall et al. 1977; Magliozzi et al. 1983). Thus, multiple sources of information are likely to yield the most reliable estimate of the prevalence of substance abuse, particularly if treatment providers with a therapeutic relationship with the patient are included.

Duration of Abuse. Substance abuse must be assessed over a specific period of time, the duration of which will influence the estimate of prevalence. As can be seen in table 1, estimates are usually higher for lifetime abuse than for the past 6 months or current abuse (e.g., Negrete et al. 1986). Whether recent or past substance abuse is being assessed may also affect the reliability of the judgments. If one has an accurate informant (patient or significant other), information on recent abuse may be more reliable, since the passage of time can easily distort memories. On the other hand, patients may be more motivated to deny recent substance abuse, for fear of potential negative consequences (e.g., loss of housing at home or supervised living arrangement, disappointment or anger from a mental health worker, blockage of attempts to enroll in rehabilitation programs). Awareness of these potential biases and the need to obtain information from a variety of sources will maximize

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reliable assessment of substance abuse.

Classes of Substance Abuse. Previous research has suggested that schizophrenic patients who are substance abusers tend to abuse a wide variety of different drugs (Blumenfield and Glickman 1967; Breakey et al. 1974). Drake et al. (1989) have commented on the difficulty of accurately assessing the abuse of different classes of drugs in this population. There are important reasons for attempting to assess the abuse of different classes of substances. It has been argued that schizophrenic patients tend to "self-medicate" their symptoms by preferentially abusing certain types of substances, particularly stimulants and hallucinogens (Pope 1979; Khantzian 1985; Schneier and Siris 1987; Siris et al. 1988). Only the assessment of specific classes of substances can address this hypothesis.

Of the studies reviewed, 6 examined unspecified classes of substance abuse, 5 examined only alcohol abuse, and 11 examined at least one specific drug class other than alcohol. However, only 4 of the 11 studies assessed abuse of more than one class of drug (Breakey et al. 1974; McLellan and Druley 1977; Siris et al. 1988; Barbee et al. 1989). Despite the use of different methodologies, the majority of these studies indicate that schizophrenic patients are more prone to abuse stimulants than other drugs, particularly when compared with affective disorder patients. Hallucinogen abuse may also be higher among schizophrenic patients, although fewer studies have assessed this question and the trend is less clear (Breakey et al. 1974; McLellan and Druley 1977; Siris et al. 1988; Barbee et al. 1989). There is some question as to whether schizophrenic patients are more likely to abuse cannabis than others, but only three studies examined cannabis abuse in non-schizophrenic patients (Cohen and Klein 1970; Breakey et al. 1974; Magliozzi et al. 1983). The evidence suggests that schizophrenic patients are not more likely to abuse alcohol, sedatives, or narcotics than other patients or controls.

To examine further the prevalence of alcohol and drug abuse in schizophrenia-spectrum disorders, we assessed the history of substance abuse in a large sample of rigorously diagnosed schizophrenic, schizoaffective, and schizophreniform disorder patients. The present study focused on the relations between the abuse of specific classes of substances and demographic variables, the history of the illness, and current domains of functioning (symptoms and social adjustment).

Methods

The subjects were 149 patients with diagnoses of schizophrenia (101), schizoaffective (42), or schizophreniform disorder (6), ages 18 to 56, who were consecutively admitted to Eastern Pennsylvania Psychiatric Institute for treatment of an acute exacerbation and who consented to participate in any of the ongoing research projects. Fifty-eight subjects had participated in biological or pharmacological studies while acutely ill, and had been assessed with the Schedule for Affective Disorders and Schizophrenia (SADS) interview (Endicott and Spitzer 1978); 91 patients had entered other studies (of psychosocial variables or of outpatient treatment), and had been assessed by the SADS or the Structured Clinical Interview for *DSM-III* (SCID; Spitzer and Williams 1985). In the present study, diagnoses were based on *DSM-III-R* criteria generated by the SCID interview or by review of the SADS ratings and recorded history.

The majority of patients were voluntary admissions (76 percent), single (94 percent), white (54 percent), male (64 percent), and were living with relatives (75 percent). The mean age was 30.3 (SD = 8.9) with a first hospitalization at 22.3 (SD = 6.0) years old. Patients had a mean of 3.8 (SD = 3.4) prior hospitalizations and remained in the hospital for 32.3 (SD = 16.2) days for the current admission.

DSM-III-R criteria were applied retrospectively to information gathered by staff from patient and family interviews, as well as charts and past records. Since all patients were assessed using structured interviews (SADS or SCID), information about drug abuse was obtained directly from patients and in most cases family members as well. Abuse of alcohol, stimulants, sedatives, cannabis, hallucinogens, and narcotics was assessed (see table 1, footnote 6, for specific drugs included in each category). For each drug category, substance abuse was rated as either recently present (patient abused drug within the past 6 months), ever present (patient abused drug sometime during his/her life), absent, or unknown. Patients for whom a history of recent or lifetime abuse could not be determined for a particular drug were dropped from analyses involving that drug, resulting in some variation in sample sizes between analyses of different drug classes.

Symptomatology was assessed 1 to 3 weeks after admission using the Brief Psychiatric Rating Scale (BPRS; Overall and Gorham 1962) and the Scale for the Assessment of Negative Symptoms (SANS;

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Andreasen 1982). Analyses were performed using the BPRS subscales (Anxiety-Depression, Anergia, Activation, Hostility, and Thought Disorder) and the summary scores for the SANS (Blunted Affect, Alogia, Apathy, Asociality, and Attention). Social adjustment was rated based on the Social Adjustment Scale-II (SAS-II; Schooler et al. 1979). The following SAS-II subscales were examined in the analyses: Work, Household, Social-Leisure, Instrumental Role Functioning, and General Adjustment. All BPRS, SANS, and SAS-II interviewers were trained to interrater reliabilities of at least Pearson $r = 0.80$ on all subscales before they interviewed study patients. Clinical ratings of symptoms and social adjustment were performed by interviewers without knowledge of patients' history of substance abuse.

Results

To protect against "alpha inflation" due to multiple statistical tests, Bonferroni bounds (Kleinbaum et al. 1988) were calculated for an overall $\alpha < 0.05$ on the basis of the total number of statistical tests conducted (74 tests). Effects that were significant at or beyond $p < 0.0007$ are significant at the Bonferroni adjusted critical $p < 0.05$ and are reported here as statistically significant. Statistical tests significant at the unadjusted $p < 0.05$ level are reported as trends, along with the unadjusted probability level.

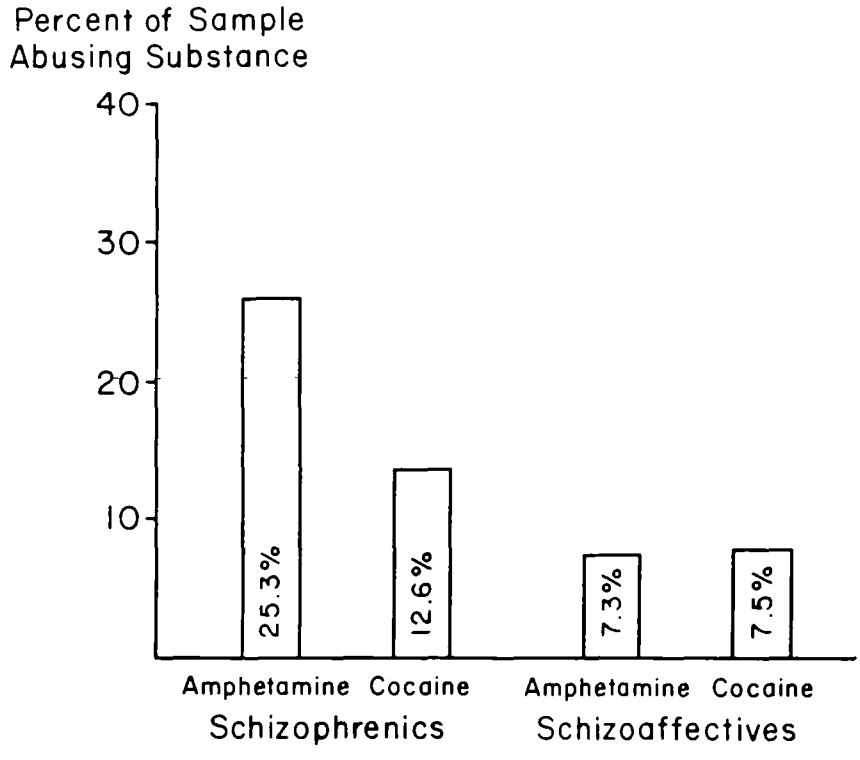
Pattern of Substance Abuse. Patients were most likely to have abused alcohol (47 percent), followed by cannabis (42 percent), stimulants (25 percent), and hallucinogens (18 percent). Relatively few patients had abused sedatives (7 percent) or narcotics (4 percent). Schizophrenic patients were more likely than schizoaffective disorder patients to have abused amphetamines but did not differ in cocaine abuse (figure 1).

To determine the degree of covariation in abuse between the different substances, correlations (Ø coefficients) were computed between the six drug categories for both recent (within past 6 months) and lifetime abuse (table 2). Inspection of table 2 indicates moderate intercorrelations among the different drug classes, with stimulant, cannabis, and hallucinogen abuse being most strongly related to each other and to other drugs.

Statistical analyses were first conducted to examine the relationship between substance abuse and categorical variables (diagnosis, demographics), then continuous variables (demographics, chronicity), and finally symptom and social adjustment measures.

Categorical and Continuous Variables. The number and percent-

Figure 1. Percentage of schizophrenic and schizoaffective patients with a history of amphetamine abuse (left) and cocaine abuse (right)



More schizophrenic patients abused amphetamines as compared to schizoaffective patients ($\chi^2 = 5.8$, $n = 136$, $df = 1$, $p < 0.02$), but the two groups did not differ in cocaine abuse ($\chi^2 < 1$, $n = 135$, $df = 1$, NS).

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Table 2. Intercorrelations among 6 drug categories for the total sample, for lifetime and recent usage

	Alcohol	Stimulants	Sedatives	Cannabis	Hallucinogens	Narcotics
Alcohol	—	0.02	0.03	0.29[2]	0.08	0.12
Stimulants	0.17[1]	—	0.26[1]	0.35[2]	0.50[2]	-0.03
Sedatives	0.13	0.29[2]	—	0.09	0.20[1]	-0.01
Cannabis	0.39[2]	0.54[2]	0.22[1]	—	0.27[1]	0.16
Hallucinogens	0.22[1]	0.39[2]	0.43[2]	0.48[2]	—	-0.02
Narcotics	0.21[1]	0.35[2]	0.26[1]	0.23[1]	0.32[2]	—

Note.—Tabled are ø coefficients between drug categories. Coefficients below the diagonal are for lifetime use, and coefficients above the diagonal are for recent use.
[1] $p < 0.05$, unadjusted.
[2] $p < 0.05$, Bonferroni-adjusted.

ages of patients in each diagnostic and demographic category who had recently or ever abused each class of substances are displayed in table 3.

Linear stepwise discriminant analyses were conducted to examine the relationship between a history of substance abuse and the following categorical variables: diagnosis, gender, race, marital status, legal status, and preadmission living arrangement. To limit the number of analyses performed, recent substance abuse was not examined. Six separate analyses were performed, one for each categorical variable as the dependent variable (e.g., diagnosis, gender), with the same set of drug classes (e.g., alcohol, sedatives) in each analysis as the independent variables. These analyses yielded information about which specific types of substance abuse were most related to each categorical variable, and are summarized in table 4.

Linear stepwise multiple regressions, similar to the multiple discriminant analyses described above, were performed to examine the relationship between *history* of substance abuse (i.e., lifetime abuse) and the following continuous variables: age, socioeconomic status (level of school factor; Hollingshead and Redlich 1958), number of prior hospitalizations, age at first hospitalization, and length of current hospital stay. Five separate analyses were conducted, one for each continuous variable as the dependent variable (e.g., age, socioeconomic status), with the set of six drug classes as the independent variables in each analysis. These analyses are summarized in table 5.

Demographic Characteristics. Gender, age, race, and socioeconomic status were all related to specific types of substance abuse. Males abused each class of drugs more than females did, particularly alcohol and cannabis. Young patients were more prone to abuse stimulants (both cocaine and amphetamines) than other drugs. There was an interaction between race and different types of substance abuse. White patients were more likely to have abused alcohol or sedatives and less likely to have abused cannabis than black patients were. Within the sedative abusers, white patients were more likely to have abused barbiturates than blacks were ($\chi^2 = 7.3$, $n = 138$, $df = 1$, $p < 0.007$, unadjusted), but not anxiolytics ($\chi^2 = 3.5$, $n = 138$, $df = 1$, NS). Finally, patients with a lower socioeconomic status were more likely to have abused cannabis.

Diagnosis and History of Illness. Schizophrenic patients showed a greater tendency to have a history of stimulant abuse than schizoaffective patients did. Stimulant abuse was also associated with an earlier age at first hospitalization, but not a greater number of hospitalizations. Cocaine and amphetamine abuse were not differentially related to age of first hospitalization, as determined by analysis of variance (ANOVA). Against expectations, a history of cannabis abuse was related to *fewer* hospitalizations.

Symptoms and Social Adjustment. The relationship of substance abuse to symptomatology and social adjustment was examined with linear stepwise multiple discriminant analyses. Three separate analyses were conducted for the *abuse history* of each drug class, one for each rating scale (BPRS, SANS, and SAS-II). For each analysis, the subscales on the measure (e.g., the

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Table 3. Number and corresponding percentage of patients who recently used (RU) or ever used (EU) each of 6 drug categories, for diagnostic and demographic variables

	Alcohol		Stimulants		Sedatives		Cannabis		Hallucinogens		Narcotics	
	RU	EU	RU	EU	RU	EU	RU	EU	RU	EU	RU	EU
Groups	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Total sample	46 (33)	66 (47)	20 (14)	35 (25)	6 (4)	10 (7)	31 (22)	58 (42)	6 (4)	25 (18)	1 (1)	6 (4)
Schizophrenic	34 (35)	48 (50)	15 (16)	28 (29)[1]	4 (3)	6 (6)	23 (23)	40 (43)	6 (6)	19 (20)	1 (1)	6 (5)
Schizophreniform	2 (40)	3 (60)	2 (40)	2 (40)	0 (0)	0 (0)	3 (60)	4 (80)	0 (0)	0 (0)	0 (0)	0 (0)
Schizoaffective	10 (26)	15 (38)	3 (7)	5 (12)[1]	2 (5)	4 (10)	5 (13)	14 (35)	0 (0)	6 (15)	0 (0)	0 (0)
Male	37 (41)	52 (57)[2]	19 (21)	30 (33)	5 (4)	7 (8)	28 (30)	50 (55)[2]	5 (5)	20 (22)	1 (1)	4 (3)
Female	9 (18)	14 (29)[2]	1 (2)	5 (10)	1 (2)	3 (6)	3 (6)	8 (17)[2]	1 (2)	5 (10)	0 (0)	2 (4)
White	30 (38)	44 (56)[3]	13 (17)	20 (27)	6 (7)	10 (13)[3]	5 (19)	29 (39)[3]	6 (8)	19 (25)	0 (0)	5 (5)
Black	16 (25)	22 (34)[3]	7 (11)	15 (23)	0 (0)	0 (0)[3]	16 (26)	29 (47)[3]	0 (0)	6 (9)	1 (2)	1 (2)
Single	45 (34)	65 (49)	19 (14)	34 (26)	6 (4)	10 (8)	30 (22)	56 (43)	5 (4)	24 (18)	1 (1)	6 (4)
Married	1 (14)	1 (14)	1 (13)	1 (13)	0 (0)	0 (0)	1 (13)	2 (25)	1 (13)	1 (13)	0 (0)	0 (0)
Voluntary	37 (35)	53 (50)	16 (15)	26 (24)	6 (5)	9 (8)	22 (20)	45 (42)	4 (4)	18 (17)	1 (1)	4 (3)
Involuntary	9 (26)	13 (38)	4 (13)	9 (28)	0 (0)	1 (3)	9 (28)	13 (41)	2 (6)	7 (21)	0 (0)	2 (6)
Family home	39 (34)	56 (49)	19 (16)	31 (27)	6 (4)	8 (7)	27 (24)	50 (44)	5 (4)	22 (19)	1 (1)	6 (4)
Boarding home	7 (28)	10 (40)	1 (4)	4 (15)	0 (0)	2 (8)	3 (12)	8 (31)	1 (4)	3 (12)	0 (0)	0 (0)

Note.—Recent use (RU) = within the past 6 months; Ever used (EU) = any prior abuse (both RU and EU scored as Yes [1] or No [0]). Tabled are the number (*n*) of each demographic class that were Yes for RU or EU, and the corresponding percentage (%) of the diagnostic or demographic class that *n* reflects. See **Methods** for definitions of drug categories, and of marital, legal, and living status.

[1] Trend for schizophrenic patients to abuse more stimulants than schizoaffective patients did in linear stepwise discriminant analysis (LSDA; $p < 0.05$, unadjusted).

[2] Significant effects for males to abuse more alcohol and cannabis than females in LSDA ($p < 0.05$).

[3] Significant effects for whites to abuse more alcohol and sedatives and less cannabis than blacks in LSDA ($p < 0.05$).

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Table 4. Discriminating diagnostic group and dichotomous demographic classes using 6 drug categories (n = 124)

Dependent variable	Classes	Code	F	R^2	Drugs ALC	STI	SED	CAN	HAL	NAR
Diagnosis[1]	Schizophrenia	1	4.4[4]	0.03		+				
	Schizoaffective	0								
Sex	Male	1	13.9[5]	0.18	+			+		
	Female	0								
Race[2]	White	1	7.5[5]	0.20	+		+	–		
	Black	0								
Marital status	Married	1	—	—						
	Single	0								
Legal status	Voluntary	1	—	—						
	Involuntary	0								
Living arrangement[3]	With family	1	—	—						
	Boarding house	0								

Note.—ALC = alcohol; STI = stimulants; SED = sedatives; CAN = cannabis; HAL = hallucinogens; NAR = narcotics (see text for definition of drug categories). Tabled are the signs for β coefficients for drug categories that emerged as statistically significant components of the linear stepwise discriminant model (LSDM). A dummy-code (1 or 0) was assigned to each class during statistical analysis. F values are based on LSDMs, with drug categories treated as independent variables. Analyses by stepwise logistic regression yielded completely parallel conclusions. Dashes indicate that no model fit with $p < 0.05$ by either criterion for a Type I error.

[1] The 6 schizophreniform patients were dropped from this analysis due to the small number.

[2] The 2 Oriental patients were dropped from this analysis.

[3] The 3 patients who lived on the streets were dropped from this analysis, as were the 14 patients who lived alone and 3 who lived with friends.

[4] $p < 0.05$, unadjusted.

[5] $p < 0.05$, Bonferroni-adjusted.

Table 5. Prediction of continuous demographic and chronicity variables using 6 drug categories (n = 124)

Dependent variable	F	R^2	Drugs ALC	STI	SED	CAN	HAL	NAR
Age (years)	12.2[2]	0.09		–				
Socioeconomic status[1]	8.4[3]	0.06				+		
Number of prior hospitalizations	5.1[3]	0.04				–		
Age (years) at first hospitalization	7.7[3]	0.06		–				
Length of stay (months)	—	—						

Note.—ALC = alcohol; STI = stimulants; SED = sedatives; CAN = cannabis; HAL = hallucinogens; NAR = narcotics (see text for definition of drug categories). Tabled are the signs for β coefficients for drug categories that emerged as statistically significant components of the linear stepwise regression model (LSRM). The F values are based on LSRMs, with drug categories treated as independent variables. Dashes indicate that no model fit with $p < 0.05$ by either criterion for a Type I error.

[1] Based on Hollingshead-Redlich Scale (1958), in which high numbers reflect lower socioeconomic status.

[2] $p < 0.05$, Bonferroni-adjusted.

[3] $p < 0.05$, unadjusted.

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BPRS) were used to examine whether the patient had a positive history of abuse for the drug class. Discriminant analyses were also performed on *recent abuse* for the three classes of drugs that had been recently abused by 10 or more patients: alcohol, cannabis, and stimulants (see table 3).

No effects were found for stimulant or narcotic abuse on any clinical variables. The abuse of some drugs was related to lower levels of symptomatology. A history of cannabis abuse was related to significantly lower scores on the Activation subscale of the BPRS ($F = 13.1$; $df = 1, 82$; $p < 0.05$), and there was a trend for lower Asociality scores on the SANS ($F = 6.4$; $df = 1, 112$; $p < 0.05$, unadjusted). There was also a trend for patients who had abused hallucinogens to have lower Anxiety-Depression scores on the BPRS ($F = 7.2$; $df = 1.83$; $p < 0.05$, unadjusted).

However, there were trends for patients who had recently ($F = 7.4$) or ever ($F = 4.0$) abused alcohol to have worse Blunted Affect as measured by the SANS ($df = 1, 114$, $p < 0.05$, unadjusted). There were also trends for patients who had ever abused alcohol to have better Work Adjustment on the SAS-II ($F = 7.2$; $df = 1, 77$; $p < 0.05$, unadjusted), but for recent alcohol abusers to have worse General Adjustment on the same instrument ($F = 6.1$; $df = 1, 77$; $p < 0.05$, unadjusted). Finally, a trend was present for patients who had abused sedatives to have higher Thought Disorder scores on the BPRS ($F = 4.6$; $df = 1, 82$; $p < 0.05$, unadjusted).

Discussion

Prevalence and Patterns of Substance Abuse. The present study was limited by the fact that retrospective ratings of substance abuse were made, and that abuse was not assessed in a matched group of psychiatric patients with diagnoses other than schizophrenia-spectrum disorders or nonpatient controls. The strengths of the study were the rigorous diagnostic procedures, the relatively large sample size, the assessment of multiple classes of substance abuse, and the use of statistical analyses that examined different classes of substance abuse simultaneously. Thus, caution must be exercised when comparing prevalence rates reported here with those for other populations.

A rough comparison can be made between the prevalence of substance abuse in this group of patients and that of the general population of persons with similar demographic characteristics living in the Northeast United States in 1985, as established in the National Household Survey on Drug Abuse (National Institute on Drug Abuse 1987*b*). Schizophrenic patients had higher rates of hallucinogen and stimulant abuse, particularly amphetamine abuse, but lower rates of cannabis, sedative, alcohol, and narcotic abuse. For example, 25 percent of the schizophrenic patients had abused amphetamines and 20 percent had abused hallucinogens, compared to only 15 percent of the general population for each drug. In contrast, only 6 percent of the schizophrenic patients had abused sedatives and 5 percent had abused narcotics, compared to 11 percent and 9 percent of the general population, respectively. It should be noted that the abuse rates cited in the National Household Survey are based on self-reports of psychoactive *substance use*, and hence are probably overestimates of the prevalence of *substance abuse disorders* in the general population, as defined by *DSM-III-R*.

These findings are consistent with a recent report of patients seeking assistance for problems with substance abuse (Ross et al. 1988), in which 22 *DSM-III* schizophrenic patients had a higher prevalence of amphetamine and hallucinogen abuse than other drugs compared with nonschizophrenic patients. These results are also in line with the review by Schneier and Siris (1987) of substance abuse in schizophrenia and with the studies reviewed here. In addition to the limitations cited above, however, it is also possible that stimulant abuse was overestimated in the present study, since amphetamine abuse may be more prevalent in Philadelphia than other urban areas in the Northeast United States (National Institute on Drug Abuse 1987*a*). Also, most of the data collected here predate the recent increase in cocaine abuse in the general population. It is unknown whether schizophrenic patients exhibit a greater preference for cocaine than the general population does when it is more readily available.

The moderate correlations for recent and lifetime abuse of the six drug classes (table 2) indicate that patients who abused drugs used a wide range of different substances. Schizophrenic patients have been found to abuse a greater variety of drugs than other patients and controls (Blumenfield and Glickman 1967; Breakey et al. 1974), although the quantity of drugs abused tends to be lower (Cohen and Klein 1970; Crowley et al. 1974; Ritzler et al. 1977). Abuse of cannabis, hallucinogens, and stimulants was more highly correlated with each other than with other drugs. However, abuse of specific drugs did not

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appear to be determined by the similarity of their effects: recent and lifetime histories of alcohol and sedative abuse were not correlated with each other, whereas recent and lifetime histories of abuse of stimulants and sedatives were. These data differ from those reported by McLellan et al. (1985), who found that psychiatric inpatients with a history of substance abuse tended to use combinations of drugs with similar, rather than opposing effects. However, their patients were heavy substance abusers with use occurring at least three times weekly, and schizophrenic patients constituted only half of the sample.

Demographic Correlates. As in research conducted with nonpsychiatric patients, demographic characteristics were strongly correlated with substance abuse. Gender, age, and race were significantly related to history of substance abuse at the Bonferroni-corrected level of $p < 0.0007$. Socioeconomic status was marginally related to drug abuse (i.e., at the *un*corrected level of $p < 0.05$), whereas marital status, legal status at admission (voluntary/involuntary), and living arrangement were not.

Males were more prone to abuse all substances than females were (table 3), with alcohol and cannabis abuse being significantly higher (table 4) in the multiple discriminant analysis. This difference is in line with an epidemiological study of psychiatric disorder in three different urban areas (Myers et al. 1984), in which males had twice the rate of drug abuse or dependence, and more than four times as much alcohol abuse or dependence as females. Many studies with psychiatric patients have also reported more substance abuse in males than females (Hensala et al. 1967; Robinson and Wolkind 1970; Chopra and Smith 1974; Hall et al. 1977; Bowers and Swigar 1983; Walker et al. 1985; Negrete et al. 1986; Solomon 1986; Drake et al. 1989). A few reports have found no gender difference in substance abuse for psychiatric patients (Fischer et al. 1975; Westermeyer and Walzer 1975; Safer 1987; Barbee et al. 1989). In the present study, only alcohol and cannabis abuse were independently related to gender. Thus, both male and female patients who had abused hallucinogens, stimulants, sedatives, and narcotics also tended to have a positive history for alcohol abuse, cannabis abuse, or both.

Age was related to substance abuse, with younger patients abusing significantly more stimulants (table 5). Young psychiatric patients have been found to abuse more drugs in most studies (Hensala et al. 1967; Robinson and Wolkind 1970; Breakey et al. 1974; Crowley et al. 1974; Fischer et al. 1975; McLellan et al. 1978; Alterman et al. 1981, 1982; O'Farrell et al. 1983; Richard et al. 1985; Negrete et al. 1986; Siris et al. 1988; Drake et al. 1989). While two reports have documented high rates of stimulant abuse among psychiatric inpatients (Robinson and Wolkind 1970) and schizophrenic admissions to an inpatient unit (Richard et al. 1985), these studies did not assess the prevalence of other types of substance abuse. Since only a history of stimulant abuse was related to age in our study, a general propensity toward substance abuse among younger patients would not explain this effect. The increased availability of stimulants over the past decade (Miller et al. 1983) is one possible explanation for greater stimulant abuse among younger patients.

Race was a significant determinant of substance abuse history. In this sample, white patients were more likely to have abused alcohol or hallucinogens, and less likely to have abused cannabis than black patients. However, previous studies that investigated racial differences in substance abuse among schizophrenic patients are not uniform in their results. Pokorny (1965) found more alcoholism and Hensala et al. (1967) found more LSD use in white than black psychiatric admissions. On the other hand, Alterman et al. (1981, 1982) reported greater covert drug abuse among black than white inpatients. While other studies have failed to find racial differences in drug abuse among psychiatric patients (Fischer et al. 1975; Westermeyer and Walzer 1975; Hall et al. 1977; Barbee et al. 1989), those studies did not examine substance abuse of different types of drugs among patients with schizophrenia. The interaction between race and drug type found in the current sample underscores the importance of examining racial differences in the patterns of abuse of different drugs; no difference between the races would have been found if overall substance abuse had been studied.

The strong relationship between demographic factors and substance abuse suggests that the environment is probably a critical determinant of who abuses which drugs. The prevalence of substance abuse in an individual's social environment, including their ethnic and peer group, influences the availability of different drugs, and hence the likelihood that they will be abused. These results indicate that the same environmental effects on drug abuse reported in the nonpsychiatric population also influence the pattern of substance abuse among

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schizophrenic patients (Spieger and Harford 1987).

Clinical Correlates. Patients with a *history* of cannabis abuse had significantly lower Activation scores on the BPRS (tension, mannerisms, and excitement) and tended to have lower Asociality scores on the SANS and fewer previous hospitalizations. While others have reported that cannabis abuse can worsen the symptoms of schizophrenia (Bernhardson and Gunne 1972; Treffert 1978; Knudsen and Vilmar 1984), *recent* cannabis abuse (within the past 6 months) was not related to symptoms in this study. The milder clinical severity of patients who had abused cannabis may reflect the interaction between social competence and environmental influences. Cannabis is often used in a social peer group, and a "culture" exists around its consumption in this society (Becker 1953). The lower symptoms of patients who had a history of cannabis abuse may reflect self-selection whereby persons who were more socially competent were more prone to abuse due to their higher exposure to the drug through social contacts. Cohen and Klein (1970) noted that most psychotic patients lacked the social skills to sustain heavy drug use, and others have reported that psychiatric patients who are alcohol abstainers are more chronic and have a worse clinical outcome than those who imbibe (Ritzler et al. 1977; O'Farrell et al. 1983).

Several other trends in the clinical data deserve brief mention. Caution should be exercised in interpreting these results, since they did not meet the stringent Bonferroni-adjusted criteria for statistical significance, although they were significant at the conventional $p < 0.05$ level. A history of stimulant abuse was found in patients with an earlier age of first hospitalization. Some studies have reported an earlier age of onset of the illness for drug-abusing schizophrenic patients (Breakey et al. 1974; Tsuang et al. 1982; Alterman et al. 1984) or psychiatric patients (Westermeyer and Walzer 1975), but others have not (Roy 1981; Hays and Aidroos 1986; Safer 1987). No research, however, has examined the importance of stimulant abuse compared with abuse of other types of drugs to the age of onset. These data suggest that stimulant use may precipitate an earlier onset of illness, although we did not have information on whether abuse actually preceded the illness.

Schizophrenic patients were more likely to have abused stimulants, particularly amphetamines, than were schizoaffective patients, although the two groups did not differ in cocaine abuse. Different mechanisms have been hypothesized to underlie the greater abuse of stimulants by schizophrenic patients, such as self-medication (e.g., Pope 1979; Schneier and Siris 1987) or a stimulant-induced schizophreniform disorder (McLellan et al. 1979; Bowers 1987). While the design of the current study does not permit a test of these theories, the data suggest that schizoaffective patients may not reflect the increased rate of stimulant abuse seen in schizophrenic patients.

A final noteworthy trend is the worse scores of Blunted Affect (SANS) of patients who had recently or ever abused alcohol. Many schizophrenic patients who abuse alcohol emphatically state that it ameliorates their symptoms (Alpert and Silvers 1970; Hansell and Willis 1977). Whether blunted affect during a drug-free state reflects the influence of chronic alcohol abuse or persistent symptoms that patients attempt to self-medicate cannot be determined. Prospective longitudinal research will be necessary to address this question.

Conclusions

Substance abuse in schizophrenia is a significant problem that has important theoretical and clinical implications for understanding and managing the course of the illness. Thus far, most of the research on the prevalence of substance abuse in schizophrenia has suffered from methodological shortcomings that impede comparisons between studies and limit the conclusions that can be drawn. Nevertheless, there is a suggestion from findings in the literature (table 1) and data presented here that schizophrenic patients are more likely to have a history of abusing stimulants (particularly amphetamines) and hallucinogens, but not alcohol or other drugs, when compared to other patient groups. Several factors are associated with an increased prevalence of substance abuse, including gender, age, race, and socioeconomic status.

For future epidemiological studies in this area to be comparable, basic methodological standards need to be considered in the design of research (see Appendix 1). Longitudinal studies with multiple assessments of both substance abuse and clinical variables will be useful in estimating the prevalence of substance abuse in schizophrenia and teasing out the differences between self-medication and the influence of abuse on the course of the illness.

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The Authors

Kim T. Mueser, Ph.D., and Hardeep Singh, M.D., are Assistant Professors of Psychiatry; Douglas F. Levinson, M.D., and Randall L. Morrison, Ph.D., are Associate Professors of Psychiatry; Alan S. Bellack, Ph.D., is Professor of Psychiatry, Director of Adult Psychology, and Director of the Behavior Therapy Clinic; Kashinath G. Yadalam, M.D., is Assistant Professor of Psychiatry, and Director of the Neuropsychiatry Clinic, Medical

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College of Pennsylvania at Eastern Pennsylvania Psychiatric Institute, Philadelphia, PA. Paul R. Yarnold, Ph.D., is Assistant Professor of Medicine and Psychiatry, Northwestern University Medical School, and Adjunct Assistant Professor of Psychology at the University of Illinois, Chicago, IL. Kimmy Kee, B.A., is a Graduate Student in Clinical Psychology at Hahneman University, Philadelphia, PA.

Appendix 1. Epidemiologic Studies of Substance Abuse in Schizophrenia: Methodologic Refinements

1. Use standardized instruments to diagnose psychiatric illness and assess substance abuse. Psychiatric diagnoses made without structured clinical interviews (e.g., the Schedule for Affective Disorders and Schizophrenia) often have poor reliability, even when modern diagnostic criteria are used (e.g., *DSM-III-R*). Patients' levels of current adaptive functioning, response to psychotropic medications, and interpersonal skill may bias the diagnostic evaluations of treatment providers. The use of standardized interview instruments tends to reduce the effects of such biases. Similarly, the use of standard instruments to assess current and past substance abuse (e.g., the Diagnostic Interview Schedule) is necessary to provide estimates of abuse prevalence that can be compared across studies conducted at different settings. Interrater reliabilities for persons conducting diagnostic and substance abuse interviews need to be established before evaluation of research subjects and should be periodically checked throughout the study. Few previous studies have documented the reliability of the assessments performed.

2. Use multiple sources of information to assess substance abuse. All sources of information about substance abuse have questionable reliability and validity. While biological measures are the most accurate, they are also the most limited, since they cannot determine social impairment resulting from abuse. Interviews conducted with patients, treatment providers, and significant others are most likely to result in accurate assessments. When information about substance abuse is ambiguous, or when clear discrepancies exist between different informants, such patients should be omitted from data analyses comparing abusers of specific drugs with nonabusers.

3. Evaluate both history of substance abuse and current abuse. Most studies on schizophrenia sample a wide range of patients with different ages and levels of chronicity. The assessment of a history of substance abuse may be more pertinent in evaluating whether schizophrenia predisposes patients to the abuse of particular drugs (or whether abuse antedates the onset of the illness) than current abuse pattern. For example, fewer older patients would be expected to be currently abusing drugs, but their history of drug abuse would be important in comparing prevalence rates across diagnostic groups. Current substance abuse may be more reliably measured than history of abuse, and it may be more relevant to predicting outcome of the illness.

4. Assess substance abuse prevalence in more than one diagnostic group. The prevalence estimates generated by any single study will be limited in generalizability to the specific setting and demographic characteristics of the sample. The extent and pattern of substance abuse in schizophrenia

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can best be evaluated by comparing it with other patient or nonpatient groups in the same or a similar setting. Patient groups such as affective or personality disorders are useful in determining the specificity of a pattern of substance abuse to schizophrenia. The assessment of nonpatient controls in addition to patient groups provides important information on whether psychiatric patients differ from others in their vulnerability to substance abuse. Controls must be examined who are similar to patients in their demographic characteristics, minimizing possible selection biases (e.g., seeking "volunteers" through advertisements may result in more literate and motivated persons).

5. Match patient and nonpatient groups on demographic variables. Gender, age, race, and socioeconomic status are related to substance abuse in the general population and psychiatric patients. Different subject groups need to have similar demographic characteristics to allow conclusions about diagnosis and substance abuse to be drawn. Age and gender are particularly important to control for, since groups of schizophrenic patients are more likely to contain a disproportionate number of young males than is true in other diagnostic groups, and young males are more prone to substance abuse. The relations between demographic factors and substance abuse should be examined across and within diagnostic groups, to determine whether similar persons are vulnerable in different groups.

6. Assess the abuse of specific classes of substances and analyze the data accordingly. While many studies have assessed alcohol and drug abuse separately, few have examined specific classes of substance abuse (e.g., stimulants, sedatives), and none has attempted to examine the abuse of different drug classes simultaneously in relation to demographic characteristics or history of illness. Without knowledge of the pattern of abuse of different drugs among schizophrenic patients, it is not possible to test alternative hypotheses about self-medication or the influence of abuse on the course of illness. Although substance abusers tend to use a variety of different drugs, differences in prevalence of abuse between drugs exist (e.g., cannabis is abused more frequently than other illicit drugs). Furthermore, the impact of continued substance abuse on schizophrenia can only be determined by examining individual types of substances.

Minority Research Training in Psychiatry

The American Psychiatric Association (APA) is pleased to announce the National Institute of Mental Health's funding for the **Minority Research Training in Psychiatry Program.** This project was developed from a recognition of the critical need to train psychiatric researchers for the future and to specifically focus on the underrepresented pool of talent represented by minorities in the field of psychiatry.

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For further information about the Minority Research Training in Psychiatry Program, call **Harold Alan Pincus, M.D., or Jeanne Spurlock, M.D.,** at the **American Psychiatric Association, 202-682-6238.**

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