

Substance-use Disorders in DSM-III-R Evidence for the Dependence Syndrome Across Different Psychoactive Substances

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Using the newly revised DSM-III-R criteria for substance-abuse diagnoses, we examined dependence syndrome elements among 83 psychiatric patients. The sample included 14 with no history of substance abuse. The remainder abused alcohol (52), sedatives (31), hallucinogens (12), stimulants (33), cannabis (44), cocaine (52), or opiates (47). Many patients (52) had abused more than one type of drug. Ten items assessing the proposed dependence symptoms for each type of drug were factor-analysed. The dependence syndrome items formed a single factor for opiates, cocaine, and alcohol, but not for other drugs. When the items were combined into cumulative scales, they had excellent internal consistency. Furthermore, they formed good approximations of unidimensional Guttman scales on which higher scores indicated greater syndrome severity. The items associated with higher scores differed across drugs, with opiates having the most striking differences from the other substances. Medical-psychosocial consequences were relatively independent of the dependence syndrome, although alcohol and cocaine dependence had some association with other problem areas. These findings support the utility of a common dependence syndrome concept for drugs of abuse as well as alcohol, and provide empirical support for the current revision of the DSM-III diagnostic criteria.

The alcohol-dependence syndrome concept, proposed in 1976 by Edwards & Gross (1976), has stimulated considerable interest in the alcoholism field as evidenced by the development of six different scales measuring syndrome elements and a number of empirical studies providing support for the construct (Orford *et al*, 1976; Litman *et al*, 1979; Stockwell *et al*, 1979; Chick, 1980; Polich *et al*, 1981; Skinner & Allen, 1982; Heather *et al*, 1983; Hesselbrock *et al*, 1983; Foy *et al*, 1984; Edwards, 1986). Within the context of the ongoing work of the World Health Organization (WHO) on nomenclature and classification of alcohol- and drug-related problems, the syndrome construct, hypothesised initially only for alcoholism, has been broadened to apply to other psychoactive substances and is part of the proposed diagnostic criteria for psychoactive substance use disorders in the 1986 draft of the International Classification of Diseases (ICD-10) (Edwards *et al*, 1981; Kendell *et al*, 1986). As articulated in a WHO memorandum (Edwards *et al*, 1981) the drug-dependence syndrome includes two testable postulates about other types of drug dependence: unidimensionality of the syndrome elements and independence of the syndrome from consequences. Unidimensionality means that the syndrome is manifested by the

clustering of certain elements to form a single dimension, and since the syndrome is not all-or-none but dimensional, with increasing severity a substance abuser manifests more of its elements. Statistical unidimensionality results from relatively uniform levels of intercorrelation among the items or symptoms within the syndrome and can be assessed by factor analysis and by various measures of internal consistency for the syndrome scale. Independence of the syndrome means that the dependence syndrome constitutes one axis of drug problems, and other problems related to substance abuse, such as legal, occupational, and family consequences of drug use, form a separate, relatively independent axis. Thus, a patient with many or most symptoms of the dependence syndrome would not necessarily have severe legal or family problems, for example, and conversely, a patient with few syndrome elements might have many other severe problems.

In revising the American Psychiatric Association's *Diagnostic and Statistical Manual*, third edition, and in the proposed ICD-10, several major changes have been made in the criteria for substance-use disorders which make this diagnostic system more reflective of the hypothesised dependence syndrome (Kendell

TABLE I
Relationship of DMS-III-R substance-dependence criteria to WHO drug-dependence syndrome elements

<i>DSM-III-R criteria</i>	<i>Dependence syndrome elements</i>
1. Repeated effort or persistent desire to cut down or control substance use.	Readdiction liability
2. Often intoxicated or impaired by substance use when expected to fulfil social or occupational obligations or when substance use is a hazard (e.g. goes to work high, drives when drunk).	Saliency
3. Tolerance: need for increased amounts of substance in order to achieve intoxication or desired effect, or diminished effect with continued use of same amount.	Tolerance
4. Withdrawal: substance-specific syndrome following cessation or reduction of intake of substance.	Withdrawal
5. Frequent preoccupation with seeking or taking the substance.	Compulsion
6. Has given up some important social, occupational, or recreational activity in order to seek or take the substance.	Saliency
7. Often uses a psychoactive substance to relieve or avoid withdrawal symptoms (e.g. takes a drink or diazepam to relieve morning shakes).	Withdrawal avoidance
8. Often takes the substance in larger doses or over a longer period than he or she intended.	Compulsion
9. Continuation of substance use despite a physical or mental disorder or a significant social or legal problem that the individual knows is exacerbated by the use of the substance.	Saliency
— Reinstatement of excessive substance use after a period of abstinence is much more rapid than initial development. (Dropped from final DSM-III-R.)	Readdiction liability
— Not represented in DSM-III-R.	Narrowing of repertoire

et al., 1986; Rounsaville *et al.*, 1986). The revised DSM-III criteria are described in Table I along with the corresponding elements of the WHO drug-dependence syndrome. The elements hypothesised as clustering together in the dependence syndrome are the following: (a) narrowing of substance-use repertoire such that substance use becomes stereotyped around a regular schedule of almost continuous or daily consumption; (b) saliency of substance-taking behaviour such that, despite negative consequences, substance use is given higher priority than other activities which had previously been important; (c) increased tolerance; (d) withdrawal symptoms; (e) substance use to avoid withdrawal; (f) subjectively experienced compulsion to use substance; and (g) readdiction liability (Edwards & Gross 1976; Edwards *et al.*, 1981). Because several items have been used to tap some of these dependence elements, the DSM-III criteria include ten, rather than seven, items.

Purpose of the present study

In the current study, the Substance Dependence section of the Structured Clinical Interview for DSM-III (SCID) (Spitzer & Williams, 1985; Rounsaville

et al., 1986) was used to measure dependence syndrome elements. Two settings were included: (a) an out-patient substance-abuse treatment unit, chosen for the high prevalence of individuals likely to receive a substance-abuse diagnosis, and (b) an in-patient psychiatric unit, in which substance-abuse is seldom the primary focus of treatment, chosen in order to test the system's ability to discriminate between those with and without a substance-use disorder. In the current report, data are analysed to assess the validity of the drug-dependence syndrome as it applies to use of both alcohol and other substances of abuse. To the extent that the dependence syndrome is shown to be valid for a range of substances, this would provide empirical support both for the dependence syndrome construct and for its inclusion in the DSM-III-R and ICD-10.

Two postulates of the dependence syndrome were evaluated: (a) the prediction that syndrome elements cluster into a unidimensional scale, and (b) the relative independence of this syndrome from legal, occupational, medical, family, and psychological problems associated with substance use. To evaluate the clustering of dependence syndrome elements into a unidimensional scale, the ten items pertaining to each substance were assessed for internal consistency using item-scale correlations and by the formation

of Guttman scales for each type of drug. The ten items for each drug were also factor-analysed. The syndrome scales were correlated with measures of consequences from the Addiction Severity Index to assess their relative independence.

Method

Setting and sample

Subjects were interviewed at two settings: (a) 41 patients from an in-patient unit of a community mental-health centre, which treats patients with a wide range of diagnoses for 28 days, and (b) 42 patients applying for treatment at an ambulatory substance-abuse treatment unit. In both settings, patients were interviewed as a sample of convenience, when the interviewers were available. For the in-patient unit, the sample was predominantly male (54%), white (51%), with a high school education or more (80%) and with an average age of 34 (s.d. 10 years). For the out-patient setting, the sample was predominantly male (74%), white (62%), with a high-school education or more (81%) and with an average age of 29 (s.d. 7 years). Thus, both samples were demographically comparable.

The patients were also assigned DSM-III diagnoses using the Diagnostic Interview Schedule (DIS), as described in a companion paper (Rounsaville *et al.*, 1987). Percentages of in-patients meeting DSM-III criteria (American Psychiatric Association, 1980) for substance abuse or dependence were as follows: alcohol 44%; sedatives 20%; cannabis 24%; stimulants 15%; opioids 34%; cocaine 22%; and hallucinogens 2%. The rates of out-patients meeting abuse or dependence on substances according to DSM-III criteria were as follows: alcohol 55%; sedatives 14%; cannabis 14%; stimulants 14%; opioids 64%; cocaine 74%; and hallucinogens 2%. As anticipated, the rates of substance-use disorders were considerably higher in the out-patient sample who identified themselves as substance abusers by seeking specialised treatment.

Although 14 subjects had no history of drug abuse and 17 reported abuse of only one type of drug, many subjects reported abusing more than one drug. The mean number of drugs abused was 2.3. The three most common combinations were cocaine and alcohol (25 patients), cocaine and opiates (24 patients), and opiates and alcohol (20 patients). Eleven patients reported abuse of all three – cocaine, opiates and alcohol – and two of these reported abuse of all seven types of drug. Other drug combinations were less common, except for cannabis with cocaine (19 patients) and cannabis with alcohol (17 patients). To evaluate the clustering of dependence-syndrome elements and to evaluate their relationship to substance-related consequences, the data from the two samples were first evaluated separately and found to be nearly identical. Hence, for economy of presentation, only the results from the combined samples will be presented here.

Instruments

Two instruments were employed in the present study:

(a) the Substance Dependence Disorders section of the Structured Clinical Interview for DSM-III (SCID) (Spitzer & Williams, 1985), and (b) the Addiction Severity Index (McLellan *et al.*, 1980; Kosten *et al.*, 1983). The SCID is designed to be used by clinicians and provides an interview guide for determining whether subjects meet DSM-III-R criteria for a range of psychiatric disorders. Two graduate-level clinicians conducted all interviews for the present study. For each criterion, which is rated as absent, subthreshold, or prototypical, the interviewer is provided with one or more questions which are read out. If the subject's response is positive or unclear, the interviewer is instructed to continue inquiry using questions of his/her choice in order to elicit examples and confirm the subject's initial response. The SCID is designed to elicit symptoms of current and/or past episodes of psychiatric disorders. For the Substance Dependence section used for the current study, subjects were asked to describe substance use during the most severe episode in their lifetime, regardless of the presence or absence of a current episode.

The version of the SCID used in this study contained an additional DSM-III-R criterion which was subsequently dropped from the final DSM-III-R. This criterion defined the syndrome characteristic of 'readdiction liability' by the statement, "Reinstatement of excessive substance use after a period of abstinence is much more rapid than initial development." The criterion was dropped from DSM-III-R because it presupposed a pattern of excessive substance use and was considered to be a hypothetical characteristic of the entire syndrome rather than an element of it. Because the primary purpose of the current report is to evaluate the drug-dependence syndrome in this sample, we included this additional criterion despite its having been eliminated from DSM-III-R.

The Addiction Severity Index (ASI) was also completed for all in-patients (one had incomplete data) and a pilot sample of 15 of the 43 out-patients. The ASI is a clinician-administered instrument that covers six major problem areas: legal, employment, medical, family, psychological, and substance abuse (McLellan *et al.*, 1980; Kosten *et al.*, 1983). Composite scales involving several items in each area have been developed to reflect current functioning. The five non-substance-abuse scales were related to the dependence-syndrome elements to examine the relative independence of these consequences from the dependence syndrome (Edwards *et al.*, 1981). The 28 out-patients who did not complete the ASI were similar to the remaining patients in demographics and in the frequencies of substance-abuse diagnoses.

Data analyses

The unidimensionality of the dependence syndrome elements was examined using three related techniques: item-scale correlations, Guttman scaling and factor analysis. The item-scale correlations and the Guttman scaling used the ten dependence items from the SCID interview to develop scales to measure the dependence syndrome. The Guttman scaling was attempted with all ten dependence items shown

in Table I, in order to examine whether some syndrome elements were common and likely to occur in isolation (low Guttman scores), while other elements were primarily reported by patients with the full-blown syndrome (high Guttman scores). In using Guttman analyses the usual reproducibility coefficient for an acceptable 'perfect' Guttman scale is 0.9. If the coefficients are substantially below this level, the cumulative scores and sequence of high-scoring (frequent) and low-scoring (rare) items will be unreliable (Guttman, 1944). A good fit of the items to a Guttman scale suggests that the cumulative scores formed by adding all the items together, when scored as 0 for absent and 1 for present, were reasonable estimates for the severity of the dependence syndrome. Comparing mean scale scores for abusers, as well as the specific dependence items associated with high and low Guttman scores, across different substances allowed us to examine how the dependence syndrome differed among various drugs. Factor analyses were also performed on the ten dependence items for each drug. When more than one factor had an eigenvalue above 1 by the initial principal components extraction, a varimax rotation was undertaken for all factors with eigenvalues greater than 1. After these dependence syndrome scales were examined for unidimensionality, the dependence scales and the five composite scales from the ASI were correlated to check for independence of the dependence syndrome from these other problem areas.

Results

Internal consistency of dependence syndrome across drugs

The dependence syndrome items were scored as 0 for not

present and 1 for subthreshold or prototypical and then added together for each drug type to form seven dependence syndrome scales with scores ranging from 0 to 10. The prototypical and subthreshold ratings were combined to simplify scaling and because subthreshold ratings were rarely made in our sample. The mean scores on these scales for the subjects reporting any of these items, and the number of subjects represented in each mean are shown in Table II, along with two measures of internal consistency - item-scale correlations and Cronbach's alpha. The values for Cronbach's alpha (Cronbach & Furby, 1970) indicated excellent internal consistency for all seven scales, and the item-scale correlations were quite good overall. All item-scale correlations were above 0.5 except for three items in the sedative scale (preoccupation, continue despite problems, and impaired in daily activity), one hallucinogen item (rapid restart of use), and three cannabis items (relief use, withdrawal, and tolerance). The mean scores show that opiate addicts reported the largest number of dependence syndrome elements and had the tightest clustering of these items, while sedative and cannabis abusers reported the fewest syndrome elements. We examined this difference in more detail by studying the distribution of number of items reported for each drug among those patients who reported any dependence syndrome items for each of the seven drugs.

As shown in Table III, item distributions of sedatives, hallucinogens, and cannabis are negatively skewed, with few patients (3-8%) reporting large numbers of syndrome items (8-10 items). In contrast, the distribution of cocaine and opiates are positively skewed, with many patients reporting large numbers of items (48% and 72%, respectively). Furthermore, 27% of the cocaine abusers and 49% of the opiate addicts reported all ten of the dependence syndrome

TABLE II
Item-scale correlations, Cronbach's alpha, and mean scale scores on dependence syndrome items for each drug of abuse ($n = 83$)

	Drug of abuse						
	Alcohol	Sedatives	Hallucinogens	Stimulants	Cannabis	Cocaine	Opiates
Dependence syndrome items:							
Relief use	0.60	0.55	0.62	0.75	0.39	0.67	0.96
Withdrawal	0.68	0.56	0.58	0.76	0.41	0.71	0.91
Preoccupation	0.74	0.40	0.69	0.67	0.60	0.88	0.89
Rapid restart	0.63	0.58	0.42	0.67	0.60	0.81	0.90
Continue despite problems	0.70	0.43	0.72	0.67	0.59	0.78	0.79
Give up non-drug activities	0.69	0.61	0.68	0.53	0.54	0.79	0.86
Impaired in daily activity	0.69	0.48	0.67	0.66	0.53	0.78	0.86
Tolerance	0.60	0.68	0.68	0.64	0.48	0.77	0.90
Inability to cut down use	0.67	0.58	0.63	0.77	0.53	0.84	0.92
Use more than intended	0.71	0.69	0.78	0.63	0.51	0.77	0.88
Cronbach's alpha ¹	0.91	0.85	0.90	0.91	0.83	0.95	0.98
Mean scores ² for users only	5.6	3.3	3.7	4.3	3.3	6.9	8.0
Number abusing each drug type	52	31	12	33	44	52	47

1. Cronbach's alpha >0.8 shows excellent internal consistency.

2. Scores ranged from 0 to 10, items scored as 0=no, 1=yes. Mean scores only for subjects reporting use of that drug

TABLE III
Number of dependence syndrome items reported for each drug of abuse (*n* = 83)

Drug of abuse	Number of items										
	0	1	2	3	4	5	6	7	8	9	10
Alcohol	31	4	4	7	7	4	3	5	9	5	4
Sedatives	52	8	8	3	2	3	4	2	0	1	0
Hallucinogens	70	3	3	2	1	0	0	1	0	0	1
Stimulants	50	5	7	3	7	2	2	0	2	3	2
Cannabis	39	12	9	6	5	5	3	2	1	0	1
Cocaine	31	3	2	6	1	6	3	6	4	7	4
Opiates	36	2	4	1	1	1	1	3	4	7	23

items. By comparison, 35% of the alcohol users reported large numbers of items. Stimulant users had an intermediate position, with 21% of them reporting large numbers of items. Thus, opiate and cocaine abusers who apply for treatment have a substantial clustering of dependence-syndrome elements, similar to alcohol abusers, but typical sedative, cannabis, and hallucinogen abusers appear to have fewer syndrome elements.

Unidimensionality of dependence syndrome

The above analyses for internal consistency strongly suggested that the ten dependence-syndrome items formed cumulative, unidimensional scales, particularly for opiates, cocaine, and alcohol. As a test of unidimensionality, we attempted to form Guttman scales for each type of drug from the ten items. The results of these analyses are shown in Table IV. As indicated by the reproducibility coefficients, most of the drugs demonstrated good approximations of 'perfectly' unidimensional and cumulative scales. The coefficients were 0.9 or above for all but two drugs - alcohol

and cannabis - and these two coefficients were close to 0.9 (0.85 and 0.87, respectively). This indicated that within each type of drug, higher scores were consistent with a more severe dependence syndrome, but the items associated with a more severe syndrome differed across the various drugs. The most striking differences were between opiates and the other drugs. For example, opiate abusers reporting "withdrawal symptoms" almost always reported every other item of the dependence syndrome (score of 10), but abusers of other types of substance often reported this item with few or no other dependence-syndrome items (score of 1-3). At the other extreme, opiate abusers often reported "using more opiates than they intended" along with few or no other dependence-syndrome items (score of 3), but abusers of other types of substance usually reported this item in conjunction with most other items in the syndrome (score of 8-10).

To test further for unidimensionality, we factor-analysed the ten items within each type of drug and found that all ten items loaded on to single factors for opiates, cocaine, and alcohol, as shown in Table V. These single factors accounted for a substantial part of the variance: 83% for opiates, 68% for cocaine, and 56% for alcohol. Obtaining these single factors suggested unidimensionality, that is, endorsing more items was consistent with the unitary concept of more severe drug dependence. Stimulants formed two factors that accounted for 67% of the variance. The factors were labelled "compulsion" and "problematic use", based on the items loading above 0.5. Sedatives and cannabis each had three factors with eigenvalues above 1. Based on the items loading on each factor, two common factors were labelled "can't stop" and "compulsion/salience". The other factor was different for the two drugs and was labelled "problematic use" for sedatives and "withdrawal consequences" for cannabis. The three factors accounted for 69% (sedatives) and 68% (cannabis) of the variance. Because five of the hallucinogen dependence syndrome items were reported by less than four respondents,

TABLE IV
Guttman scale scores¹ using dependence-syndrome items for each drug of abuse (*n* = 83)

	Drug of abuse						
	Alcohol	Sedatives	Hallucinogens	Stimulants	Cannabis	Cocaine	Opiates
Dependence syndrome items:							
Relief use	1	1	1	1	2	2	4
Withdrawal	2	3	2	6	1	1	10
Preoccupation	3	2	4	2	7	5	9
Rapid restart	4	4	3	5	5	4	2
Continue despite problems	5	5	6	3	3	3	1
Give up non-drug activities	6	6	7	4	4	7	7
Impaired in daily activity	7	10	10	7	10	9	6
Tolerance	8	9	7	9	6	8	8
Inability to cut down use	9	7	5	8	9	6	5
Use more than intended	10	8	9	10	8	10	3
Reproducibility coefficient ²	0.85	0.91	0.97	0.91	0.87	0.90	0.94

1. Numbers are Guttman scores for patients reporting item; less frequent items have higher scores (see text).
2. Reproducibility coefficient >0.9 indicates good approximation of unidimensional scale.

TABLE V
Factor structure of dependence syndrome items for each drug of abuse¹ (n = 83)

Dependence syndrome items	Factor labels by drug of abuse											
	Alcohol	Cocaine	Opiates	Stimulants	Hallucinogens	Sedatives	Compulsion	Compulsion	Compulsion	Withdrawal		
	Dependence syndrome	Dependence syndrome	Dependence syndrome	Compulsion	Problematic use	Dependence syndrome	Can't stop	Problematic use	Compulsion	Compulsion	Can't stop	Withdrawal
Relief use	0.67	0.97	0.72	0.57	0.59	*	-	0.59	-	-	-	0.84
Withdrawal	0.74	0.93	0.76	0.74	-	*	0.80	-	-	-	-	0.86
Preoccupation	0.80	0.91	0.91	0.76	-	*	-	-	0.90	0.76	-	-
Rapid restart	0.70	0.92	0.85	-	0.58	*	0.74	-	-	-	0.83	-
Continue despite problems	0.77	0.83	0.82	-	0.83	0.81	-	0.77	-	-	-	0.65
Give up non-drug activities	0.76	0.88	0.84	-	0.83	0.83	-	0.79	-	0.67	-	-
Impaired in daily activity	0.76	0.89	0.83	-	0.65	0.80	-	0.66	-	0.91	-	-
Tolerance	0.76	0.92	0.81	0.81	-	0.80	-	-	0.73	-	0.69	-
Inability to cut down use	0.74	0.94	0.88	0.52	0.66	*	0.86	-	-	-	0.84	-
Use more than intended	0.77	0.90	0.81	0.81	-	0.89	-	-	0.65	0.55	-	-

1. Dashes (-) indicate loadings below 0.4.

2. Rare items (*) deleted.

TABLE VI
Correlations between dependence syndrome scales¹ and Addiction Severity Index problem severity scores² for each drug of abuse (n = 55)

ASI problem severity scores	Drug of abuse						
	Alcohol	Sedatives	Hallucinogens	Stimulants	Cannabis	Cocaine	Opiates
Medical	0.07	0.12	-0.23	-0.08	-0.19	-0.01	0.09
Work	0.14	0.08	-0.29*	-0.10	-0.11	-0.32*	0.12
Legal	-0.12	0.23	0.07	0.21	0.26	0.46***	0.03
Family	0.29*	0.10	-0.05	-0.01	-0.15	0.03	0.13
Psychological	0.32*	0.10	-0.25	-0.06	-0.13	-0.13	-0.12

1. Dependence scale is additive score from the ten dependence syndrome items for each type of drug, scores range from 0 to 10, with higher scores indicating more dependence syndrome items reported; See Tables II and III.
2. Problem scales from ASI are composites of self-report items on which higher scores indicate more severe problems; scores range as follows: legal (-0.01 to 0.18), work (-0.5 to 0), medical (0 to 0.33), family (-0.06 to 0.16), psychological (0.33 to 1.0).
* $P < 0.05$, *** $P < 0.0005$.

these infrequent items were removed. Including all ten items resulted in three factors, of which one included all five infrequent items. When these items (indicated by * in Table V) were deleted, the other five items loaded together as a single factor that accounted for 69% of the variance.

Independence of dependence syndrome from drug-use consequences

The dependence syndrome was quantified for each drug type using a simple additive scale including all ten items, as described above, and these seven dependence syndrome scales were correlated with five composite problem severity scales from the ASI: legal, work, medical, family, and psychological. Higher scores on these ASI scales indicated more severe problems in each area. The mean scores (\pm standard deviations) on these five ASI scales were: legal 0.06 (\pm 0.05), work -0.12 (\pm 0.18), medical 0.09 (\pm 0.10), family 0.02 (\pm 0.07), psychological 0.74 (\pm 0.17). As shown in Table VI, five of the 28 correlations between the seven dependence scales and the ASI scales were significant, and this is more than expected by chance alone. The alcohol-dependence scale correlated with family problems ($r = 0.29$, $P < 0.04$) and psychological problems ($r = 0.32$, $P < 0.02$); the cocaine dependence scale correlated with legal problems ($r = 0.46$, $P < 0.0004$) and work problems ($r = -0.32$, $P < 0.02$); and the hallucinogen dependence scale correlated with work problems ($r = -0.29$, $P < 0.04$). Overall, however, the ASI scales were relatively independent of the dependence syndrome scales, and even for significant associations the shared variance was small.

Discussion

Is the dependence syndrome valid for all drugs?

This study is a first systematic psychometric

examination of the dependence syndrome among abusers of non-alcoholic substances. Based on the newly revised DSM-III-R substance-abuse criteria (Rounsaville *et al*, 1986), we found that the ten items in the draft form of the SCID formed internally consistent scales for all seven drugs under study. For alcohol, opiate, and cocaine abusers the dependence syndrome scale met several criteria for unidimensionality, including all items loading on to a single factor, and forming good approximations to 'perfect' Guttman scales. For the other drugs - stimulants, sedatives, hallucinogens, and cannabis - a clear unidimensional structure was not confirmed by every type of analysis, but even for these drugs, simple cumulative scales seemed to provide satisfactory measures of a dependence syndrome that was independent of medical-psychosocial problems. However, these problems were somewhat related to the dependence syndrome for alcohol and cocaine. Thus, our findings supported the utility of the dependence syndrome for other drugs besides alcohol by specifically demonstrating that the syndrome elements clustered into unidimensional scales for most drugs and that this syndrome was relatively independent of medical-psychosocial problems.

The different types of statistical analysis used to test for unidimensionality of the dependence syndrome were not consistent for all seven drugs of abuse. The simplest tests using raw correlations among items suggested that several items did not substantially contribute to a simple dependence-syndrome scale for every drug. These low contributors differed among the seven drugs, but for most drugs each item was an important contributor. Based on these statistical analyses, no particular item seemed

to merit deletion in order to improve internal consistency over all seven drug types. Even when the low contributors were included in a total cumulative scale, we found excellent scale properties according to coefficient alpha, and the mean scale scores were consistent with the item-scale correlations. Scales with high intercorrelations (e.g. opiates) also had high mean scores for the abusers of this drug, because those subjects who reported one item were also likely to report most other items. Scales with lower intercorrelations (e.g. sedatives) had lower mean scores, because abusers of these drugs tended to more frequently report only a few items. Thus, the inconsistencies with unidimensionality seemed minor using simple statistical approaches.

These correlational results encouraged the examination of a stronger model for unidimensionality, Guttman scaling. The good fit of these items to Guttman scales suggested that the cumulative scores were reasonable approximations of severity for the dependence syndrome, allowing us to systematically compare relative severity of dependence across drugs. Among the users of each type of drug, opiates were associated with the most severe dependence and cannabis with the least dependence. This is consistent with general clinical experience for substance abusers and gives further support to this new system for classifying substance abuse. Moreover, polydrug use was common in our samples, and patients who used several drugs during their lives consistently rated opiates and cocaine as more severe problems than cannabis or sedatives. In general, all seven scales appeared to be good unidimensional measures of dependence, in which higher scores indicated more severe dependence.

Comparing frequent to uncommon items within these scales suggested which elements of the syndrome were likely to occur early (frequent items) or late (uncommon items) in the substance-dependence careers of the various types of abuser. Among alcoholics and most other abusers, withdrawal, and "preoccupation with use" were frequent and probably early elements, but these occurred less frequently and were probably later elements among the opiate addicts. This sequence difference among opiate addicts may simply be an artifact of the large percentage of opiate addicts who reported every dependence item, but it is also consistent with the 'chipping' described by most opiate addicts at the start of their careers. Chipping addicts do not get withdrawal symptoms and are not yet preoccupied with getting their next 'fix' of heroin (Chein *et al.*, 1964). In contrast, alcohol use is usually not considered a problem until some type of at least mild

withdrawal symptoms begin occurring, and the same may be true for cannabis (Litman *et al.*, 1979; Marlatt & Gordon, 1980). For cocaine abusers, a 'crash' is commonly described, even following limited recreational use (Gawin & Kleber, 1986), and this crash may be reported as withdrawal symptoms. At the other extreme, many opiate addicts reported "using more than intended" early in their careers. The relatively frequent occurrence of accidental overdoses with opiates compared with accidental overdoses of the other drugs may be an extreme clinical manifestation of this difference, but otherwise there seems no obvious reason why opiate abusers might not share this early characteristic with other illicit drug abusers such as cocaine abusers. Moreover, opiate abusers appeared to be atypical in their development of the dependence syndrome, although they had the strongest support for a coherent syndrome.

The factor analyses of the ten items for each drug raised the most significant questions about the unidimensionality of the dependence syndrome for stimulants, sedatives, and cannabis. For hallucinogens, the separation into three factors seemed partially due to low-frequency items that reflected idiosyncratic responses to hallucinogens, such as withdrawal symptoms. After these items were dropped, the remainder loaded on to a single factor. Although a compulsion factor was formed for stimulants, sedatives, and cannabis, its content was not uniform across the three drugs and these analyses did not support a unidimensional dependence syndrome. The biaxial concept of Edwards *et al.* (1981) that dependence may be relatively independent of social consequences was given some support by the "problematic-use" factors for stimulants and sedatives, because the items in these factors reflect social consequences of abuse. Moreover, the single factors that were found for alcohol, cocaine, and opiates demonstrated more coherence among the dependence-syndrome elements than other studies have found for alcohol abuse (Edwards, 1986). In summary, the status of the dependence syndrome for stimulants, sedatives, and cannabis needs further work with larger samples, but based on the other internal reliability analyses we decided to use simple additive scales for all seven drugs as a dependence syndrome axis to examine the postulate that the dependence syndrome was relatively independent of 'drug-related problems'.

The correlations of the dependence syndrome with consequences clearly indicated that many problem areas were relatively independent of the dependence syndrome. The strongest association was between the cocaine dependence syndrome

scale and legal problems, and it may reflect the need for increased amounts of illegal activities as the abuser becomes more 'dependent' on the drug. In support of this argument, the only licit substance – alcohol – demonstrated a negative correlation with legal problems, while for all the other drugs the correlations were positive. Other significant correlations accounted for less than 10% of the variance and were inconsistent across drugs, suggesting the need for confirmation before being overinterpreted.

Study limitations

This preliminary study has several limitations. First, the sample size is small and limited to one treatment centre, although it included both in-patients and out-patients as well as subjects who were not substance-abusers. These non-abusers assured that the correlational analyses using the dependence syndrome scales were not biased by limited variability, although the large number of non-abusers for some drugs such as hallucinogens would overstate the tendency for a single syndrome to fall out from the factor analyses. Future studies will need larger samples, perhaps from different cultural settings. Second, these subjects had all sought treatment, and this self-selection bias may need to be addressed through community studies. Third, the ASI was designed to assess both lifetime and current (last 30 days) problems, but the SCID was administered to reflect the period of most intense substance abuse. For the vast majority of these subjects, the current episode of abuse was their most severe, but for hallucinogens, in particular, many of the subjects were not currently experiencing their most severe abuse. Relatively few subjects also reported hallucinogen abuse, and so any interpretations of these findings must be quite tentative. Future studies will need to be designed to have better correspondence between time frames for the dependence-syndrome assessments and the psychosocial measures. Fourth, some subjects had abused more than one drug. The most frequent combinations were opiates with cocaine, and alcohol with cocaine. Using 'pure' drug-abusers would facilitate interpretations across the different drugs, but this is practically impossible in most current treatment programmes, in which abuse of more than one drug is common (Simpson & Sells, 1974; Hubbard *et al*, 1983).

Conclusion

The present study provides encouragement for undertaking more intensive work with other substances besides alcohol using the newly revised DSM-III-R.

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