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Michigan Assessment-Screening Test for Alcohol and Drugs (MAST/AD): Evaluation in a Clinical Sample

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In this study, we sought to evaluate a modification of the Michigan Alcohol Screening Test designed to include problems associated with other drug abuse/dependence besides alcohol. Scores of the lifetime Michigan Assessment-Screening Test/Alcohol-Drug (MAST/AD) were compared to other lifetime measures of substance abuse and dependence and to psychiatric scales reflecting current or recent symptoms. Two university medical centers with alcohol-drug programs located within departments of psychiatry hosted 520 patients with alcohol-drug-related diagnoses. Patients completed their own MAST/AD using a paper-and-pencil format. Based on interviews with the patient, a research associate rated the patients' substance-related problems on the Minnesota Substance Abuse Problem Scale (M-SAPS) and obtained information on lifetime treatment for substance abuse. An addictions psychiatrist determined abuse or dependence and made a current diagnosis of alcohol abuse/dependence only, drug abuse/dependence only, and alcohol plus drug abuse/dependence. The MAST/AD was highly correlated with the M-SAPS and several other measures of substance abuse morbidity. Patients with alcohol-only and drug-only diagnoses did not differ from one another on the MAST/AD, although both groups had lower scores than those with alcohol plus drug diagnoses. Current psychosocial morbidity as assessed by the patient and the psychiatrist was associated with the MAST/AD, although less strongly than with lifetime substance abuse measures. The lifetime MAST/AD demonstrates reliability as a severity measure for alcohol and/or or drug abuse. With minor modification, this standard measure can be

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expanded from alcohol diagnoses to all substance diagnoses. This study in a clinical population did not demonstrate its utility as a screening instrument; additional work is needed to reveal its utility for this purpose. (Am J Addict 2004;13:151–162)

Several decades ago, patients with substance abuse disorders typically presented with abuse or dependence on one substance.[1,2] In recent years, it has become more common for substance abusers to consume a variety of psychoactive substances, either concurrently or in sequence. As a consequence, patients as well as their clinicians may be unable to ascribe specific consequences to specific substances. For example, in the clinical sample described in this study, only 35% of 520 patients had only an alcohol-related diagnosis. Among the remainder, 24% had a drug-only diagnosis; and the remaining 42% had both an alcohol and drug diagnosis.

Despite the mixture of alcohol and other substance use in the general population, most screening instruments for substance abuse focus on alcohol use.[3–18] Some instruments assess drugs other than alcohol, but these have been used primarily in detoxification protocols or in research protocols for specific drugs of abuse, such as cocaine.[19–23] Relatively few instruments target the sequela of substance abuse generally, regardless of the combinations or permutations of substances used.[24,25]

Although originally designed by Selzer as a screening instrument for alcoholism,[3] the Michigan Alcoholism Screening Test (MAST) has seen wide use as a severity index for alcoholism.[26] The MAST has correlated well with more time-consuming or expensive measures requiring interview.[26,27] The MAST requires only several minutes of the patient's time to complete, can be scored score by hand or a software program, and has been well analyzed[28,29] and widely used.[30,31]

Over the last fifteen years, we have employed a modified version of the MAST that substitutes "alcohol and/or drugs" for "alcohol" on each MAST item. We have referred to this modified version of the MAST as the Michigan Assessment-Screening Test/Alcohol-Drug (MAST/AD). Combining alcohol and drugs in this one instrument provided the following advantages:

- The modified version served as a brief self-report instrument for assessing general addiction severity, rather than using diverse, non-comparable instruments for separately assessing alcohol and other drug abuse.
- Use of MAST/AD permitted us to draw on the extensive published information on the MAST.
- The addition of the drug query required little or no additional time for patients to complete, as compared to the original MAST.
- Patients who used alcohol and drugs concurrently did not have to guess whether the associated problem was due to alcohol only.

This study aimed at assessing the MAST/AD in a mixed-patient population of alcohol and/or drug abusers/dependdependents. We assessed the reliability and validity of the MAST/AD against other measures of Substance Related Disorders, including the Minnesota Substance Abuse Scale (an interview-based rating scale), clinician assessment of abuse-versus-dependence, self-help history, lifetime number of substances abused, four mea-

sures of lifetime substance abuse treatment, a comparison of alcohol-only vs. drug-only vs. alcohol + drug diagnoses, and two measures of psychosocial morbidity. We hypothesized the following:

- Measures of lifetime substance abuse would correlate significantly with the lifetime MAST/AD.
- MAST/AD scores would not differ between alcohol-only and drug-only patients, although scores among alcohol + drug patients might be higher due to their meeting criteria for at least two substance abuse diagnoses.
- Self-reported and psychiatrist-rated measures of current psychosocial morbidity would correlate significantly with the MAST/AD, although less strongly than the lifetime substance abuse measures.

METHOD

Patients

A total of 520 outpatients aged eighteen and older were studied at two alcohol-drug programs located in psychiatry departments at two university settings. Upon entry into the alcohol-drug program for assessment, the patients provided informed consent to the scientific use of these data in an anonymous and confidential fashion. All patients met DSM-IV criteria for a substance related disorder (SRD). This population has been described in previous reports.[32–37] Thirty-two patients were dropped from the original sample ($N = 552$) for one or more of the following reasons: less than eighteen-years-old, data sets incomplete, or failure to meet DSM-IV criteria for a substance-related disorder. The demographic characteristics of the 520 subjects were as follows:

- Age: mean 30.7 years (s.d. 9.7)
- Gender: 55% men, 45% women
- Education: mean 12.7 years (s.d. 2.5)
- Marital status: 57% single, 14% married, 29% other
- Employment: 38% employed, 5% homemakers, 57% unemployed, disabled, or retired
- Residence: 48% with family or friends, 52% alone, institutionalized, or homeless.

Current diagnoses, made by a psychiatrist with addiction certification or training, involved the following substances: alcohol abuse/dependence, 75.4%; cannabis, 32.2%; opioid, 12.9%; cocaine, 11.3%; amphetamine, 10.2%; sedative, 6.7%; mixed, 4.2%; and hallucinogen, 2.7%. The total added to more than 100% because many patients met diagnostic criteria for abuse/dependence of more than one substance.

The Modified Michigan Alcohol-Drug Assessment Scale

The MAST, developed by Selzer as a screening test three decades ago,[3] has also served as a measure of severity and insight.[28–31,38] The MAST and our modification (the MAST/AD) elicit lifetime information. We replaced the term "alcohol" on each MAST item with the phrase "alcohol and/or drugs" or other relevant phrase and retained the original weighted scoring system (see Appendix 1 for these changes). The MAST and MAST-AD contain 25 items with weighted scoring as follows: zero point, 1 item; one point, 4 items; two points, 17 items; five points, 3 items. In addition, two of the items are scored for the number of times the event occurred, so that the subject has a score of five for each episode of delirium tremens (Item 18) and a score of 2 for each alcohol-drug arrest (Items 23 and 24). Although most patients scored in the teens to thirties, those with numerous arrests and/or withdrawal delirium can achieve high scores of 40 or above.

The Minnesota Substance Abuse Problem Scale

This scale (the M-SAPS) was developed for either interview-based or self-rating.[25] In this study, the interviewer-based version was used; a trained clinical associate conducted this interview. (Clinical associates included master's trained nurses, a social worker, and a psychologist.) The M-SAPS consists of sixty items designed to tap into seven problem domains associated with excessive substance use: psychological, pharmaco-behavioral, occupational-academic, family, interpersonal, financial, and legal. Unlike other addiction-related instruments, it aims at the following (1) assessment of the consequences of all substance use, and not only alcohol or a drug, and (2) assessment of psychosocial consequences specifically associated with substance use (rather than psychopathology generally). Although the M-SAPS could be used for either lifetime or period prevalence data, the data presented here were based on lifetime assessments. The sixty items are all weighted equally, unlike the MAST and MAST/AD, which have several weighted items. We used the M-SAPS rather than the Addiction Severity Index because the M-SAPS items are tied to specific behaviors and events and thus require less judgment to score. In addition, the M-SAPS specifically excludes psychological symptoms that are not related to substance use. Finally, the M-SAPS does not include biomedical conditions that could vary with the substance of abuse.

Measures of Substance Abuse Morbidity

The first measure was based on the addiction psychiatrist's assessment of abuse-only versus dependence on one or more substances. A second measure involved the lifetime number of substances used by the subject, obtained on interview by a clinical associate. The third measure involved the number of self-help efforts employed, based on a scale previously described.[39] Four additional measures, also previously described[40] and obtained by a clinical associate, consisted of lifetime treatment variables:

- Number of treatment categories ever used for substance disorder out of seven categories: detoxification, general hospital, state hospital, residential program, halfway house, therapeutic community, and outpatient/day program
- Number of separate admissions to any treatment category
- Days in treatment for substance abuse (one outpatient visit equated to one day)
- Total cost of substance abuse treatment using imputed costs

Other Measures

Three other measures were employed to (1) compare MAST/AD scores among those with alcohol-only versus drug-only versus alcohol + drug diagnoses, and (2) to assess whether current psychosocial measures might relate to MAST/AD scores. With regard to the second goal, a patient-rated symptom scale, the 90-item Symptom Checklist or SCL-90,[41] was employed to assess the degree of correlation between the MAST/AD and a self-rated scale of current psychological symptoms not specifically tied to lifetime substance use. A psychiatrist-rated measure of psychosocial symptoms and function, the Global Assessment Scale or GAS,[42,43] was used to assess the correlation between the MAST/AD and a psychiatrist-rated scale of current symptoms and function not specifically due to lifetime substance use.

Data Collection

Patients completed their own MAST/AD. Trained research associates conducted

the M-SAPS interview and obtained information on the number of substances ever used, number of previous self-help categories, types of facilities at which care had previously been obtained (eg, detoxification, general hospital, state hospital, residential program, halfway house, therapeutic community, or outpatient/day program), number of previous admissions to treatment for substance abuse, total numbers of days in treatment, and lifetime cost of treatment (using imputed costs rather than actual costs). An addictions-trained psychiatrist made the current SRD diagnosis at the time of admission. The trained interviewers and the addiction psychiatrist were blind to the patient's self-rated MAST/AD.

Statistical Analyses

We analyzed the data using the following statistical measures:

- Mann-Whitney test for dyadic non-parametric data (as MAST/AD scores did not describe a normal curve but were skewed)
- Correlation coefficient for comparison of two continuous distributions
- ANOVA to compare alcohol only, drug only, and alcohol + drug diagnoses
- Point biserial correlation coefficient to assess the effect size

As Meehl has noted, the significance level should be reduced when a large number of subjects is studied due to the appearance of small, non-replicable, but statistically significant findings in studies involving large samples.[44] Thus, we have reduced the alpha level of significance to $p < .001$. We have also reported and commented on the size of the correlation coefficient, because in large sample sizes, some fairly small correlation coefficients are statistically significant.

FINDINGS

Distribution of MAST/AD Scores

MAST/AD scores ranged from 2 to 51, with a mean score of 27.8 (standard deviation 12.8) and a median of 28. Among the 520 scores, 21 patients (4.0% of the total) had scores from 2 to 4—below the usual cut-off score—producing a false negative rate of 4%. The remaining 96% of patients had scores in the pathological range.

Correlation between MAST/AD and M-SAPS

See Fig. 1 for a scattergram of the MAST/AD and M-SAPS scores. The correlation between the MAST/AD and total M-SAPS score was $r = +0.689$, indicating a strong statistical correlation but with some distinction between the two scales. Note that many patients who scored less than 10 on the MAST/AD scored more than 10 on the M-SAPS—probably from the M-SAPS capacity to detect early psychological, behavioral, and interpersonal problems related to substance abuse. By contrast, relatively few patients with low M-SAPS scores had high MAST/AD scores—probably due to the fact that patients with high MAST/AD scoring items (eg, AA attendance, DTs, arrests, or hospitalization or care seeking for substance abuse) are likely to manifest psychological, behavioral, or interpersonal problems. However, this discrepancy between the MAST/AD and the M-SAPS scores becomes less at high MAST/AD scores above 40.

As shown in Table 1, five of the M-SAPS subscales (interpersonal, family, psychological, occupational/academic, and pharmaco-behavioral problems) showed strong correlations with the MAST/AD, ranging from 0.547 to 0.583. All of these subscales involved items that were

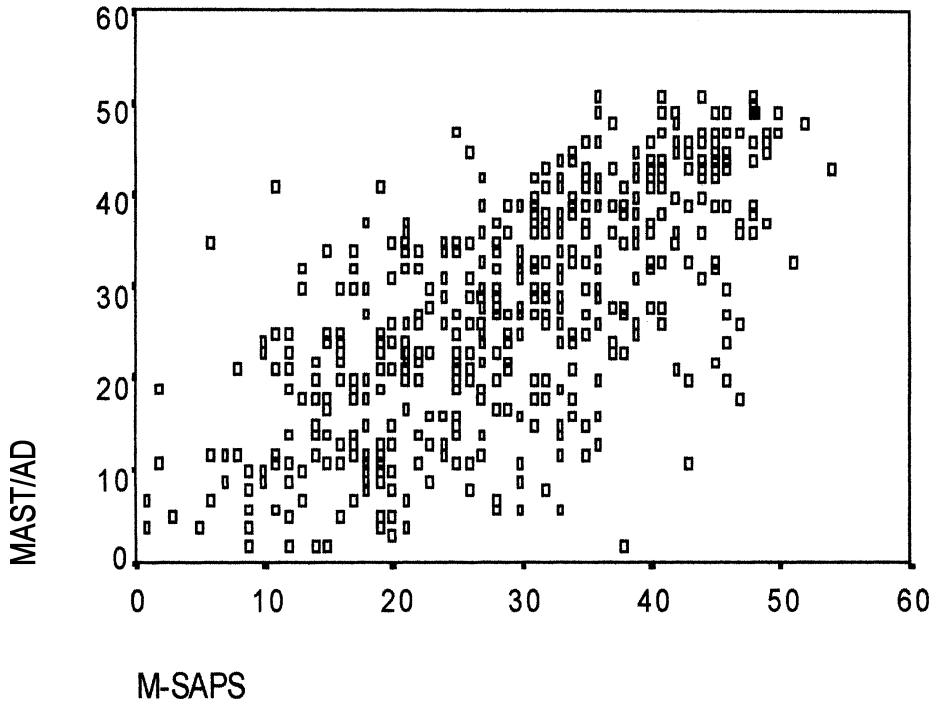

FIGURE 1. *Scattergram of Modified Michigan Alcohol-Drug Assessment Scale scores versus Minnesota Substance Abuse Problems Scale scores among 520 Patients.*

commonly reported, with standard deviations less than their means. Two of the subscales, ie, legal and financial problems, showed weaker correlations of .387 and .421 with the MAST/AD (although these were also statistically significant at $p < .001$). These last two M-SAPS subscales consisted of items that were reported less often, and their standard deviations approximated the means.

Correlation/Association Between MAST/AD and Other Measures of Addiction Severity

All seven indicators of addiction severity showed a significant relationship to the MAST/AD at $p < .001$ (see Table 1). Dependence on one or more psychoactive substances was associated with a higher MAST/AD scores, as compared to abuse-only ($F\ (2,\ 517) = 6.814$), with a point biserial r of .219. Lifetime number of substances used and number of self-help strategies were also correlated with higher MAST/AD scores. All four treatment measures also varied significantly with the MAST/AD scores, albeit over a wide range, with correlation coefficients ranging from a high of 0.572 to a low of 0.299.

Correlation/Association Between MAST/AD and Other Measures

Among this group of 520 patients, 180 had an alcohol diagnosis only, 122 had only drug diagnoses, and 218 had alcohol plus drug diagnoses. ANOVA comparison of these three groups showed a statistically significant difference at $p < .001$ ($Z\ (2,\ 517) = 5.005$). Tukey B test revealed that the alcohol-only and drug-only groups did

TABLE 1. **Correlation of the Modified Michigan Alcohol-Drug Assessment Scale with Other Measures of Morbidity in Substance-Related Disorders in 520 Patients**

Measures of Morbidity	MAST/AD Mean and SD	Statistics*
Minnesota Substance Abuse Problem Scale		
Total M-SAPS score	28.9 (11.6)	r = +.689, $p < .001$
Interpersonal problems	2.9 (1.9)	r = +.583, $p < .001$
Family problems	3.4 (2.0)	r = +.575, $p < .001$
Psychological problems	10.2 (4.5)	r = +.564, $p < .001$
Occupation/academic problems	2.4 (1.7)	r = +.550, $p < .001$
Pharmaco-behavioral problems	7.7 (2.7)	r = +.547, $p < .001$
Financial problems	1.3 (1.3)	r = +.421, $p < .001$
Legal problems	1.0 (1.1)	r = +.387, $p < .001$
Lifetime Indicators of Substance Abuse Severity		
Abuse vs. dependence		
abuse only, $n = 174$	23.9 (12.7)	Point biserial r = .219
dependence, $n = 346$	29.8 (12.4)	
Categories of Rx for SRD	1.9 types (1.8)	r = +.572, $p < .001$
Categories of self-help	2.9 types (2.2)	r = +.406, $p < .001$
Days in SRD Rx †	112 days (199)	r = +.385, $p < .001$
Cost of SRD Rx †	$25,152 (44,777)	r = +.362, $p < .001$
Number substances ever used	7.0 subst. (2.5)	r = +.349, $p < .001$
Number of admissions to SRD Rx †	5.1 admits (11.1)	r = +.299, $p < .001$
Miscellaneous Indicators		
Substance Related Diagnoses		
alcohol only, $n = 180$	26.4 (12.4)	
drug only, $n = 122$	25.7 (13.3)	Point biserial r = .114
alcohol + drug, $n = 218$	30.2 (12.5)	
SCL-90, Genl. Symptom Index	1.04 (0.77)	r = +.319, p < .001
Global Assessment Scale	48.9 (14.3)	r = −.241, p < .001

*r = Pearson correlation coefficient
†SRD Rx = Substance related disorder treatment

not differ significantly from one another, but both of these groups showed significantly lower MAST/AD scores than the alcohol + drug group. The point biserial correlation coefficient was .114.

The patient self-rated 90-item Symptom Checklist (SCL-90) did bear a statistically significant relationship to the MAST/AD scores, although the correlation (r = +.319) was smaller than the correlations between the MAST/AD and most substance-related variables. The clinician-rated Global Assessment Scale also showed a relatively weak but still statistically significant relationship to the MAST/AD (r = −.241).

DISCUSSION

Modifying the Mast to Include Drugs and Alcohol

One might argue for the development of a new instrument, rather than the modification of the older Selzer instrument, developed at a time when alcohol-only diagnoses predominated. However, the original MAST has stood the test of time and continues to be widely used for alcoholism with good results. Despite its relatively fewer items compared to later instruments aimed at assessing the severity of alcoholism, the MAST has proven useful, not only as a screening test, but also as a measure of lifetime alcoholism severity. In addition, its items have shown good validity in use either as a screening test or as a measure of alcoholism severity. Thus, we believe that expansion of the basic instrument so as to apply to all substance abuse is economic in both clinical and research contexts while also permitting comparison to past studies of alcoholism.

In addition to modifying the items slightly, we also modified the title of the instrument. We retained the "Michigan" term, since our version relies strongly on the original instrument designed and named by Selzer. We have added "Assessment" to "Screening" in the title because the instrument has seen wide use in addicted populations as a morbidity or severity measure and not solely as a screening instrument in populations not identified as addicted. And finally, we retained the term "Test," and added "/Alcohol-Drug" to indicate that the measure taps into both categories of psychoactive substances.

Use of the MAST/AD in Assessing Lifetime Substance Abuse Morbidity

These data demonstrate that, with a small modification on most items, Selzer's Michigan Alcohol-Drug Screening Test can address other substance disorders besides alcoholism. In this sample of patients being assessed in two substance abuse programs, the modified instrument stood up well against numerous measures of substance abuse morbidity in which the variables related to substance abuse regardless of specific substance or substances.

Comparison of the MAST/AD and M-SAPS demonstrated the apparent greater sensitivity of the M-SAPS at low scores, say, below 10. At high scores, the two instruments do not differ greatly. Two factors account for this observed difference: (1) the greater number of items in the M-SAPS, which has 35 more items than the 24-item MAST/AD, and (2) the weighting of the MAST/AD scores, which can escalate a few positive responses above threshold levels in the case of patients with numerous episodes of withdrawal delirium and/or alcohol-related arrest (the M-SAPS is unweighted by item). If one wanted a longer, more detailed instrument to assess substance-related morbidity, especially in a younger or more socially intact group, the 20-minute M-SAPS would be worth the additional time to complete and score. (The M-SAPS subscales also provide more information regarding the type of psychosocial problems associated with substance use.) For a more chronic or morbid group of patients, the MAST/AD can be completed in several minutes—an advantage in patients with a short attention span.

Current Distress as Cause Versus Effect of Elevated MAST/AD Scores

Current psychosocial morbidity, both self-assessed (by the SCL-90) and psychiatrist-assessed (by the GAS), bore significant correlations with the MAST/AD. One explanation is that higher psychosocial distress may play a role in elevating MAST/AD scores. Another explanation is that greater lifetime substance abuse morbidity results in more current psychosocial

distress. Several of our studies have demonstrated that MAST/AD scores among substance abusers comorbid for several psychiatric disorders were comparable to the scores of patients with substance abuse-only.[32–37] These latter findings suggest that greater current distress does not elevate the MAST/AD. On the contrary, greater lifetime substance abuse morbidity (on the MAST/AD) probably produces greater current distress (on the SCL-90 and GAS).

A Caveat

This evaluation in a clinical sample of identified patients with an addictive disorder has shown the utility of the MAST/AD as a rapid, reliable, inexpensive measure of lifetime morbidity associated with substance abuse. However, this study has not shown the utility of the MAST/AD AD in identifying undetected cases of addictive disorder in a general population, whether clinic-based or community-based. We are currently conducting such a study in a clinic-based population. Internal consistency of the items and factor analysis will be conducted in that data set.

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APPENDIX 1. **Michigan Assessment-Screening Test/Alcohol-Drug**

Number and Item	Score	
	Yes	**No**
0. Do you enjoy a drink *or drug use* now and then?	0	0
1. Do you feel you are a normal drinker *or drug user*? (By normal we mean you drink *or use drugs* less than or as much as most other people.)	0	2
2. Have you ever awakened the morning after some drinking *or drug use* and found that you could not remember a part of the evening?	2	0
3. Does you wife, husband, a parent, or other near relative every worry or complain about your drinking *or drug use*?	0	1
4. Can you stop drinking *or using drugs* without a struggle after one or two drinks *or drug doses*?	0	2
5. Do you feel guilt about your drinking *or drug use*?	1	0
6. Do friends or relatives think you are a normal drinker *or drug user*?	0	2
7. Are you able to stop drinking *or drug use* when you want to?	0	2
8. Have your ever attended a meeting of Alcoholics Anonymous, *Narcotics Anonymous or other self-help group for drug use*?	5	0
9. Have you gotten into physical fights when drinking *or drug use*?	1	0
10. Has your drinking *or drug use* ever created problems between you and your wife, husband, a parent, or other relatives?	2	0
11. Has you wife, husband (or other family members) ever gone to anyone for help about your drinking *or drug use*?	2	0
12. Have you ever lost friends because of your drinking *or drug use*?	2	0
13. Have you ever gotten into trouble at work because of your drinking *or drug use*?	2	0
14. Have you ever lost a job because of drinking *or drug use*?	2	0
15. Have you ever neglected your obligations, your family, or your work for two or more days in a row because you were drinking *or using drugs*?	2	0
16. Do you drink *or use drugs* before noon fairly often?	1	0
17. Have you ever been told you have liver trouble? Cirrhosis?	2	0
18. After heavy drinking *or drug use* have you ever had Delirium Tremens (D.T.'s) or severe shaking, or heard voices or seen things that really weren't there? How many times? __ *	2	0
19. Have you ever gone to anyone for help about your drinking *or drug use*?	5	0
20. Have you ever been in a hospital because of drinking *or drug use*?	5	0
21. Have you ever been a patient in a psychiatric hospital or on a psychiatric ward of a general hospital where drinking *or drug use* was apart of the problem that resulted in hospitalization?	2	0
22. Have you ever been seen at a psychiatric or mental health clinic or gone to any doctor, social worker, or clergyman for help because of any emotional problem, where drinking *or drug use* was part of the problem?	2	0

(continued)

APPENDIX 1. **continued**

Number and Item	Score	
	Yes	**No**
23. Have you ever been arrested for drunk driving, driving while intoxicated, or driving under the influence of alcoholic beverages or drugs? How many times? —†	2	0
24. Have you ever been arrested, or taken into custody, even for a few hours, because of other drunk *or drug-related* behavior? How many times? —†	2	0

Italics indicate added phrases regarding drug use.
Five points or more indicates that the subject is probably a substance abuser, four points is suggestive, and three points or less is normal. Eight points and above is strong evidence for chronic substance abuse or dependence.
*5 points for each episode of Delirium Tremens (Item 18)
†2 points for each arrest in Items 23 and 24