

Screening and Assessment Study

Wisconsin Division of Juvenile Corrections  
Alcohol and Other Drug Abuse

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## Background to the Screening Study

The Division of Juvenile Corrections (DJC) initiated a study to address their long-range goal of standardizing the screening and assessment process for the identification and referral of juveniles suspected of drug abuse. The over-arching aim of the present study was to validate an assessment instrument which screens for alcohol and drug problems among teenagers, the Adolescent Alcohol and Drug Involvement Scale (AADIS) (Moberg, 2000). The AADIS was developed by combining two similar tools, the Adolescent Drug Involvement Scale (ADIS; Moberg & Hahn, 1991) and the Adolescent Alcohol Involvement Scale (AAIS; Mayer & Filstead, 1979; Moberg, 1983). Specifically, the study was designed to evaluate the AADIS' accuracy as a predictor of a substance use disorder (SUD) in a sample of juveniles in the Wisconsin corrections system. SUDs were measured by an existing and psychometrically sound diagnostic interview, the Adolescent Diagnostic Interview-Light (ADI-L) (Winters, 2000). In addition to the AADIS accuracy analysis, the study also focused on the AADIS' internal consistency reliability and the prevalence rate of SUDs in the juvenile sample.

## Study Design

Background of the ADI-L. The Adolescent Diagnostic Interview (ADI) (Winters and Henly, 1993; Winters, Stinchfield, Fulkerson, and Henly, 1993), the precursor to the ADI-L, is a structured diagnostic interview designed to assess DSM-III-R and DSM-IV criteria for SUDs in adolescents. As a highly structured interview, the ADI has demonstrated reliability and validity in settings and with counselors and therapists similar to those used in the present study. Several psychometric investigations provide support for the interview's psychometric properties when well-trained professionals and paraprofessionals administer the tool. The psychometric evidence indicates that abuse and dependence diagnoses obtained from the ADI (1) are associated with favorable test-retest reliability (range of kappas, .80-.83; mean, .82) and interrater agreement (range of kappas, .53-1.00; mean, .78); (2) significantly discriminate

groups defined by concurrent measures and independent clinical staff ratings of problem severity; and (3) are concordant with independent diagnosis obtained from diagnostic experts (range of kappas, .71-.85, mean, .78) (Winters and Henly, 1993; Winters et al, 1993).

For the purposes of the Wisconsin Department of Corrections Study, the ADI was modified in order to accommodate the need to assess only DSM-IV criteria and to permit easy hand scoring of abuse and dependence symptoms and diagnoses. The revised instrument is the ADI-L.

Procedures. Administration of the two tools of interest in the study, the AADIS and the ADI-L, was the responsibility of staff at the three participating sites (EAS, LHS and SOGS) in the Division of Juvenile Corrections. The AADIS was administered as an interview to all incoming juveniles by the Reception Social Worker and forwarded to the Section Manager. The Section Manager was responsible for referring the youth to the AODA Assessment Social Worker for the interview administration of the ADI-L. The Social Worker who administered the ADI-L was blind to the juvenile's results on the AADIS.

At the SOGS program, all girls who received the screening tool also were administered the ADI-L. However, the high volume of boys at EAS and LHS meant that it was unnecessary for research purposes to administer the ADI-L to all detainees. Thus, the design called for ADI-L administration to all EAS and LHS boys who scored 42 or higher on the AADIS, and to administer the ADI-L to every third EAS and LHS boy who scored below 42 on the AADIS. The cut score of 42 has been established in earlier research for the ADIS (Moberg & Hahn, 1991). (There was one exception to the procedures described above for administering the ADI-L at EAS and LHS. If the Reception Social Worker indicated a need for a comprehensive assessment despite a low score on the AADIS, the ADI-L was administered to that individual.)

Data collection occurred over a five-month period from June 2000 - October 2000. It was

expected that 175 - 225 youth would be administered both the AADIS and ADI-L. All completed instruments were photocopied and mailed to the Center for Adolescent Substance Abuse Research at the University of Minnesota, Minneapolis for data cleaning, data entry, and statistical analysis.

Training in administration of the AADIS was conducted by Dr. Paul Moberg and in administration of the ADI-L by Dr. Ken Winters. The training included an overview of the development of the interview, a review of administration guidelines, and an overview of scoring procedures. Data collectors were instructed to contact Dr. Winters if they had subsequent questions about administration and scoring the ADI-L.

Subjects. Participating juveniles were detainees sequentially admitted to one of three correctional facilities in Wisconsin (EAS, LHS, SOGS). Two-hundred-and-forty-two youth were administered both the AADIS and ADI-L and 83 youth were administered only the AADIS. The average age of the study sample was 15.6 (range 11-17-years-old) with the majority being male (87%) and either African American (47%) or white (36%). Table 1 provides a summary of the sample characteristics.

Table 1: Study Sample Characteristics (N = 325)

Variable	n	%
Boys	281	87
Girls	44	13
Ethnicity		
African American	151	47
White	116	36
Other	58	17
Age (mean = 15.6)		
11-13	25	8
14	57	18
15	106	33
16	109	34
17	28	9
AADIS & ADI-L	242	74
AADIS only	83	26
Setting		
EAS	175	54
LHS	106	33
SOGS	44	13

Substance use consumption characteristics based on ADI-L results are summarized in Table 2. Briefly, marijuana was the drug reported to be used by the most youth; 76% indicated they had used marijuana five or more times during their lifetime and 71% of users indicated they were regular marijuana users for at least a one month period. Sixty-four percent of the youth reported that they used alcohol during their lifetime at least five times, and 68% of drinkers said they drank regularly for at least one month. The four other drugs reported to be used the most frequently after marijuana and alcohol were cocaine (18%), hallucinogens (16%), amphetamines (10%), and inhalants (7%).

Table 2: Drug Use Consumption Characteristics of the Sample Based on ADI-L Results (N = 242)

Variable	n	%
Drank more than 5+ times -lifetime	154	64
Drank to intox. within last 6 mo. > 5 times*	55	36
Drank regularly for at least month*	49	32
Used marij. more than 5+ times - lifetime	185	76
Used marij. within last 6 mo. > 5 times**	127	69
Used marij. regularly for at least month**	132	71
Ever used other drugs		
cocaine	44	18
hallucinogens	39	16
amphetamines	23	10
inhalants	18	7
combination	17	7
opioids	12	5
barbiturates	10	4
PCP	7	3
Used other drugs more than 5+ times - lifetime	26	11

Notes. \* Among drinkers; \*\* among marijuana users

Prevalence of SUD. The prevalence rates of SUD groups among detainees that received the ADI-L are presented in Table 3. Consistent with the substance use consumption data, marijuana abuse and marijuana dependence diagnoses were the most prevalent compared to the other SUD groups. Forty percent of the sample met criteria for marijuana dependence and 24% met criteria for marijuana abuse. This contrasts with 22% having met criteria for alcohol dependence and 19% having met criteria for alcohol abuse. We also grouped the diagnostic data into mutually exclusive groups: no SUD, abuse only, and any dependence. Thirty percent of the sample did not have any abuse or a dependence diagnosis for any drug; 25% of the sample met criteria for at least one substance abuse disorder but did not meet criteria for any substance dependence disorder; and 45% of the sample met criteria for at least one substance dependence disorder. Boys reported slightly higher rates of a SUD compared to girls, and African American youth had slightly lower rates of a SUD compared to the other ethnic groups.

Table 3: Prevalence Rates of Substance Use Disorder Groups Based on ADI-L Results (N=242)

Variable	Total (n=242)		Boys (n=198)		Girls (n=44)	
	n	%	n	%	n	%
No alcohol disorder	143	59	116	59	27	61
Alcohol abuse	45	19	38	19	7	16
Alcohol dependence	54	22	44	22	10	23
No marijuana disorder	86	36	66	33	20	46
Marijuana abuse	58	24	50	25	8	18
Marijuana dependence	98	40	82	41	16	36
<b>Aggregate groups</b>						
No substance use disorder	73	30	56	28	17	39
Abuse only	61	25	52	26	9	20
Any Dependence	108	45	90	46	18	41

Adjusted Prevalence Rates of SUDs. As noted in the procedures section, a sampling strategy was implemented in which some youth did not receive the ADI-L because they were in the group who scored low on the AADIS and were not randomly selected to receive the interview (n=83). Therefore, the prevalence estimates of SUDs in the sample of 242 subjects that are

reported in Table 3 provide a biased estimate of the true prevalence rate of SUDs in the juvenile corrections system. We computed adjusted prevalence rates by weighting the sample to correct for the cases that did not receive the ADI-L. The adjusted prevalence rates of the three diagnostic groups are reported in Table 4 (no diagnosis, 43%; abuse only, 23%; and any dependence, 34%). These rates are generally comparable to the rates found with the unweighted sample. The one noteworthy difference is that the adjusted rate of the no diagnosis group (43%) is higher than the unweighted rate of this group (29%).

Table 4: Adjusted Prevalence Rates of Substance Use Disorder Groups Based on ADI-L Results (N = 325)

Variable	Total	
	n	%
Aggregate groups		
No substance use disorder	139	43
Abuse only	76	23
Any Dependence	110	34

AADIS. The means, standard deviations, and coefficient alphas (internal consistency reliability) for the AADIS for subject groups are reported in Table 5. Girls had a higher mean score than boys (44.5 and 38.5, respectively) and African Americans had a lower mean score (32.5) than whites (45.5) and subjects in the other ethnic group (44.6). Favorable alpha coefficients were obtained across all demographic subgroups (range .92-.95). These findings suggest that the AADIS was developed through proper sampling of the problem severity content domain, and that the screening scale measures a well-defined set of attributes. An item analysis indicates that nearly all items had a very high item-total correlation (range .55 - .81). One item was an outlier with a very low item-total correlation (-.06), *When did you first ever use drugs or take your first drink?*

Table 5: AADIS Statistical Properties

Group	Mean	St. Dev.	Coeff. Alpha
Total (n=325)	39.3	21.5	.94
Boys (n=281)	38.5	21.1	.93
Girls (n=44)	44.5	23.4	.95
Afr. Amer. (n=151)	32.5	20.6	.93
White (n=116)	45.5	21.2	.93
Other ethnicity (n=58)	44.6	19.4	.92

Prediction Analysis. To examine the AADIS' ability to accurately predict a SUD, the AADIS was tested against presence or absence of any SUD based on the ADI-L. First, a discriminant function analysis was conducted on the data. This analysis identified an optimal cut score of 35 on the AADIS. This cut score correctly classified 85% of the juvenile offender sample into no SUD versus any SUD groups; sensitivity (true positive) and specificity (true negatives) were .59 and .96, respectively. Thus, false classifications occurred in only 15% of the sample with this cut score, but 41% of those scoring a positive AADIS were "false positives."

We also conducted a logistic regression analysis because the variance on the AADIS scores for the two criterion groups was unequal. A logistic regression is a nonlinear analysis that requires fewer assumptions than discriminant analysis. The logistic regression analysis identified an optimal cut score of 37 on the AADIS. This cut point also correctly classified 85% of the cases; sensitivity and specificity were .62 and .95 respectively. Whereas the logistic regression analysis had the same overall classification rate as the discriminant function analysis, the logistic analysis produced a better sensitivity rate compared to the other analysis.

Table 6 provides classification data for a range of scores on the AADIS. Given that a screening tool should strive to minimize the error of incorrectly identifying a person as not having the target

problem (false negatives), and considering that the logistic regression analysis is the more appropriate data analytic strategy for this data set, it stands to reason that an AADIS score of 37 is the optimal cut score for predicting no SUD group membership versus any SUD group membership. Scores at 37 or higher produced an 85% overall classification rate, or a false classification rate of only 15%. Furthermore, this cut score produced a minimal false negative rate (.05) and a tolerable false positive rate (.38). (The prediction analysis yields the same optimal cut score when the using weighted data.)

Table 6: Classification Data for a Range of Scores on the AADIS in Predicting a Substance Use Disorder (N = 242)

AADIS Score	Hit Rate	True +	True -	False+	False -
32	83%	.49	.98	.51	.02
33	82%	.49	.96	.51	.04
34	82%	.51	.96	.49	.04
35*	85%	.59	.96	.41	.04
36	84%	.59	.95	.41	.05
37**	85%	.62	.95	.38	.05
38	84%	.62	.94	.38	.06
39	84%	.64	.92	.36	.08
40	85%	.67	.92	.33	.08

Notes. True+ = sensitivity; true- = specificity; \* optimal cut score identified by discriminant function; \*\* optimal cut score identified by logistic regression.

We conducted a supplementary analysis on cases identified as false positives and false negatives. Assuming the 37 cut point on the AADIS, we identified 28 false positive cases (i.e. the AADIS incorrectly rated these individuals as having a SUD when the ADI-L indicated no SUD). Seventy five percent of these cases were male and their mean score on AADIS was 48 (range 38-71). As expected, these cases had relatively elevated scores on the AADIS. There were nine false negative cases (i.e., the AADIS incorrectly rated these individuals as not having a SUD but the ADI-L indicated that one was present). All of these cases were male and they

had a mean AADIS score of 31 (range 26-35). Among these cases, seven were in the abuse only group and two were in the any dependence group.

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Analysis of the "Override" Group. Some youth that had a low score on the AADIS and were not randomly selected to receive the ADI-L nevertheless were administered the interview when the Case Worker recorded that an assessment referral was appropriate. Among these 32 "override" individuals, 60% did not meet any criteria or a SUD, 22% were in the drug abuse only group, and 8% were in the any dependence group. In general, the Case Workers were "correct" almost half the time in deciding that the juvenile needed an ADI-L despite a low score on the AADIS. Their decision to over-ride the AADIS is understandable when you observe that nearly half of these cases had an AADIS score between 34 and 41.

### Summary

The results of the study support two general conclusions. First, the study confirms the value of screening juveniles for SUDs in the Wisconsin Department of Corrections system. The adjusted rate of any SUD based on the ADI-L was over 50% (abuse only, 23%; any dependence, 34%).

Thus, there is justification to regularly screening for substance use disorders in this population with an accurate and standardized screening tool.

The second general finding from the study is that the AADIS is affirmed as a useful screening measure. The AADIS appears to differentiate between those who do not have any SUD and those that have at least one. The accuracy of the optimal cut score identified by the logistic regression analysis (37 or greater) produced a classification rate that was significantly better than chance expectations. The study also supports the view that the AADIS does a relatively better job predicting the absence of a SUD rather than the presence of a SUD (as reflected by a sensitivity of .95 and a specificity of .60). This finding is favorable given that it is more desirable for a screening tool to forsake specificity in favor of higher sensitivity. Given these overall results that support the psychometric adequacy of the AADIS, a decision to use this screening tool in the Division of Juvenile Corrections is backed by scientific evidence.

The favorable data on the accuracy of the AADIS to identify general SUD groups does not, however, minimize the importance of confirming a diagnosis with a comprehensive assessment tool such as the ADI-L. The AADIS produced a false positive rate of 38%, which means that an appreciable percent of positive AADIS scorers would have been falsely labeled as having a SUD if the comprehensive assessment process had been omitted. Thus, the importance of a thorough assessment to confirm the presence of a possible SUD can not be understated.

The findings should be interpreted in the context of the limitations of the study. For one, consider the criterion measure that we implemented - the presence or absence of a substance use disorder based on the ADI-L. There is undoubtedly measurement error associated with using any diagnostic interview, even highly structured ones like the ADI-L. Also, the application

of DSM-IV criteria of abuse and dependence on adolescent populations has been called into question by some investigators (Martin & Winters, 1998).

Nevertheless, taken as a whole, the current data suggest that the AADIS is highly accurate:

Misclassifications are low and the scale's performance exceeds predictions made from the base rate of substance use disorders in the study population. The AADIS appears to provide a sound basis for referring a juvenile detainee for further evaluation of a possible drug abuse problem.

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