

Regular article

# A comprehensive review of the psychometric properties of the Drug Abuse Screening Test

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## Abstract

This article reviews the reliability and the validity of the (10-, 20-, and 28-item) Drug Abuse Screening Test (DAST). The reliability and the validity of the adolescent version of the DAST are also reviewed. An extensive literature review was conducted using the Medline and Psychinfo databases from the years 1982 to 2005. All articles that addressed the reliability and the validity of the DAST were examined. Publications in which the DAST was used as a screening tool but had no data on its psychometric properties were not included. Descriptive information about each version of the test, as well as discussion of the empirical literature that has explored measures of the reliability and the validity of the DAST, has been included. The DAST tended to have moderate to high levels of test–retest, interitem, and item–total reliabilities. The DAST also tended to have moderate to high levels of validity, sensitivity, and specificity. In general, all versions of the DAST yield satisfactory measures of reliability and validity for use as clinical or research tools. Furthermore, these tests are easy to administer and have been used in a variety of populations. © 2007 Elsevier Inc. All rights reserved.

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## 1. Introduction

The Drug Abuse Screening Test (DAST) is a 28-item face-valid self-report measure of problematic substance use that is utilized for clinical screening and treatment/evaluation research (Skinner, 1982). Responses to the DAST are given as binary (yes/no) items, each valued at one point, yielding a total score ranging from 0 to 28. A cutoff score of 6 is generally used to indicate drug abuse or dependence problem. The complete text is available online (Projectcork, 2005).

The DAST was developed and validated by Dr. Harvey A. Skinner at the Addiction Research Foundation, Toronto, Canada (now the Center for Addiction and Mental Health). The instrument's three versions (DAST-28, DAST-20, and

DAST-10) are copyrighted by Dr. Harvey A. Skinner, although they are made generally available for not-for-profit research, clinical, and educational purposes. A draft manual and copies of DAST-20 and DAST-10 are available.<sup>1</sup>

The items comprising the DAST are modifications of the items comprising the Michigan Alcoholism Screening Test (MAST) (Skinner, 1982). The MAST is a 25-item self-report survey of problematic alcohol use (Selzer, 1971). The original validation study of the DAST utilized a sample of drug/alcohol abuse clients with the purposes of: (1) determining “item characteristics and scale reliability”; (2) examining the dimensionality of DAST items via factor analysis; (3) evaluating “the degree to which the DAST is influenced by social desirability,

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denial, and carelessness responses styles”; and (4) examining the “correlations of the DAST with demographic characteristics, frequency of illicit drug use, and indices of psychopathology” (Skinner, 1982).

The DAST has been used to assess drug use within a variety of groups, including people with alcohol and drug problems (Gavin, Ross, & Skinner, 1989; Skinner, 1982), psychiatric patients and outpatients (Carey, Carey, & Chandra, 2003; Cocco & Carey, 1998; Maisto, Carey, Carey, Gordon, & Gleason, 2000; Staley & El-Guebaly, 1990), adults seeking evaluation at an adult attention-deficit/hyperactivity disorder (ADHD) clinic (McCann, Simpson, Ries, & Roy-Byrne, 2000), union members (including identified drug users and nonusers) (El-Bassel et al., 1997), narcotic users (Skinner & Goldberg, 1986), female offenders (Salstone, Halliwell, & Hayslip, 1994), adolescents (Klitzner, Schwartz, Gruenewald, & Blasinsky, 1987; Martino, Grilo, & Fehon, 2000), substance-abusing minority women in abusive relationships (El-Bassel et al., 2003), mothers of young children with substance abuse problems (Kemper, Greteman, Bennett, & Babonis, 1993), inpatient substance abusers (Bohn, Babor, & Kranzler, 1991), and persons with depressive disorders and cocaine dependence (Kush & Sowers, 1996).

The DAST has been in use for more than two decades. Within such time, only a single review of its psychometric properties has been published (Skinner, 2001). That review included only a brief description of the tool and discussed its psychometric properties as published by the author in the early 1980s (Skinner, 1982). In the past two decades, a great deal of research has been conducted to assess the psychometric properties of the DAST. We provide an exhaustive review of the literature that addresses issues on the reliability and the validity of the DAST to (a) help clinicians to better understand the strengths and the weaknesses of the DAST, and (b) to point out areas in which more research is needed.

## 2. Methods

The Medline and Psycinfo databases were searched from 1982 to 2005 for the terms “DAST” and “reliability” and “DAST” and “validity.” Articles that included measures of reliability or validity of the DAST were included in the current review. Articles were excluded if the DAST was used to only measure the validity of another instrument and the work could not be used to assess the reliability or the validity of the DAST. Articles were also excluded if the DAST was used as a screening tool to identify problematic substance use but no data on reliability or validity were presented. We identified five publications in this way. Five other publications that addressed the reliability and the validity of the DAST were identified from the reference sections of those initial five sources.

## 3. Results

### 3.1. Administration and scoring

The DAST is a self-administered test that can be used by both nonprofessional and professional personnel. It takes 5–10 minutes to administer the 28-item test. Shorter versions and an adolescent version have been developed (see below for descriptions of DAST-10, DAST-20, and DAST-A). Most of the items are scored by assigning one point for each “yes” response. Only three items are keyed for a “no” response:

- Item 4 “Can you get through the week without using drugs?”
- Item 5 “Are you always able to stop using drugs when you want to?”
- Item 7 “Do you try to limit your drug use to certain situations?”

The cutoff score for abuse/dependence is generally 6 or above. However, it is important to mention that different cutoff scores are recommended for different populations and for different versions of the DAST (Staley & El-Guebaly, 1990). For example, DAST-10 has a cutoff score of 3 (Skinner, 1982), and DAST-A (Grilo & Fehon, 2000) has a cutoff score 7 or above. In addition, Staley and El-Guebaly suggested that a range of cutoff scores on the DAST offers clinicians and researchers a choice of valid cutoff points, depending on the need for high test sensitivity or specificity. Detailed information about these psychometric issues will be addressed in Discriminative Validity.

### 3.2. Alternate forms of the DAST

Three alternate versions of the DAST have been developed: DAST-10 (Bohn et al., 1991), DAST-20 (Skinner & Goldberg, 1986), and DAST-A (Martino et al., 2000). DAST-10 contains 10 items from the original DAST. These are Items 1, 3, 5, 8, 9, 10, 15, 21, 23, and 24. Seven of the questions of DAST-10 are written identically to those in the original DAST, and three have been rewritten with minor modifications. For example, Question 23, “Have you ever experienced withdrawal symptoms as a result of heavy drug intake?” was changed to read, “Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?” Item 21, “Have you engaged in illegal activities to obtain drugs?” was changed to “. . . activities in order to . . .?” Item 9 was changed from “Do you ever feel bad about your drug abuse?” to “Do you ever feel bad or guilty about your drug abuse?”

DAST-20 (Skinner & Goldberg, 1986) contains 20 items from the original DAST. These are the 10 DAST-10 items, plus Items 2, 4, 12, 14, 16, 17, 18, 22, 25, and 27. Most of DAST-20 items are identical to those of the DAST. All of the modifications from DAST-10 were included in DAST-20. Two other changes were also included. Item 12, “Has

drug abuse ever created problems between you and your spouse?” became “spouse or parents.” Item 15, “Have you ever neglected your family or missed work because of your use of drugs?” was made more specific by removing the words “or missed work” from of the question.

DAST-A was developed for use on a population of adolescents (Martino et al., 2000). DAST-28 total score tends to be negatively correlated with age (Gavin et al., 1989; Skinner, 1982; Skinner & Goldberg, 1986; Staley & El-Guebaly, 1990), which suggests that some items may not be appropriate for younger respondents. Some of the items in the adolescent version were modified for such a population. For example, items referring to “spouse” were modified by replacing the word “spouse” with “boyfriend/girlfriend,” and “work” was changed to “school.” In addition, this version of the DAST contains only 27 items, as two questions that addressed prior treatment episodes were combined into one.

The concurrent validity of the short versions of the DAST has been measured. Skinner (1982) reports that DAST-20 correlated almost perfectly ( $r = .99$ ) with the original 28-item version of the DAST. Cocco and Carey (1998) reported that DAST-20 and DAST-10 highly correlated ( $r = .97$ ) with each other. Furthermore, they showed that DAST-10 and DAST-20 correlated, as expected, with other alcohol, drug, and psychiatric indices (Cocco & Carey, 1998). Martino et al. (2000) report that the items comprising DAST-A are based on the items of the DAST. However, the authors did not measure the criterion validity of DAST-A.

### 3.3. Reliability

Table 1 summarizes the internal consistency and the test–retest reliability of DAST-28, DAST-20, and DAST-10. Estimates of internal consistency via coefficient  $\alpha$  for DAST-28 range from .92 to .94, with three of four studies reporting  $\alpha$  coefficients of .92. Internal consistency estimates of DAST-20 have a wider range (.74–.95). The

two estimates of internal consistency for DAST-10 are .86 and .94.

Another measure of internal consistency that has been reported in a number of studies of the DAST is item–total correlation (i.e., correlations of individual items on the DAST with the total DAST score). Most studies report moderate to high item–total correlations. In general population samples, the lowest item–total correlations for DAST-28 were found for Item 7, “Do you try to limit your drug use to certain situations?” ( $r = .24$ ), and Item 20, “Have you ever been arrested for driving while under the influence of drugs?” ( $r = .099$ ) (El-Bassel et al., 1997). Skinner (1982) also reported a low item–total correlation on DAST-28 for Item 7 ( $r = .24$ ) for a sample of people seeking help for drug-related and alcohol-related problems. Staley and El-Guebaly (1990) reported the lowest item–total correlation on DAST-28 for Item 7 in a psychiatric patient population ( $r = .005$ ) and low item–total correlations for Item 4, “Can you get through the week without using drugs other than those required for medical reasons?” ( $r = .216$ ), and Item 20 ( $r = .293$ ). Another study evaluating DAST-20 and DAST-10 in psychiatric patients reported that the lowest item–total correlations for DAST-20 were Item 4 ( $r = .04$ ) and Item 5, “Are you always able to stop using drugs when you want to?” ( $r = .26$ ). For DAST-10, the lowest item–total correlation for this sample was for Item 5 ( $r = .21$ ) (Cocco & Carey, 1998). For DAST-A, the lowest item–total correlations were found for Question 20 ( $r = .22$ ) (Martino et al., 2000). Overall, item–total correlations for most DAST items ranged from .32 to .79, depending on the item and sample population.

Two studies investigated the test–retest reliability of the DAST. El-Bassel et al. (1997) reported a test–retest correlation coefficient of .85 for DAST-28 in a population of union members ( $n = 20$ ) who were retested 2 weeks after the initial administration of the test. Cocco and Carey (1998) reported test–retest reliability data for DAST-20 and DAST-10 for a psychiatric patient population. The test–retest reliability for DAST-20 was found to be .78 ( $n = 45$ ); for DAST-10, it was .71 ( $n = 45$ ). The second administration of

Table 1  
Reliability by DAST version

| Version    | Study                     | Subjects  | Internal consistency | Test–retest reliability |
|------------|---------------------------|---|----------------------|-------------------------|
| DAST-28    | Staley & El-Guebaly, 1990 | 250 Psychiatric patients  | .94                  |                         |
|            | McCann et al., 2000       | 143 Adults seeking evaluation at the adult ADHD clinic  | .92                  |                         |
|            | El-Bassel et al., 1997    | 176 Union members, including identified drug users and nonusers                               | .92                  | .85 ( $n = 20$ )        |
| DAST-20/28 | Skinner, 1982             | 223 Volunteers seeking help for drug and alcohol problems                                     | .92                  |                         |
|            |                           |   | .95                  |                         |
| DAST-20    | Salstone et al., 1994     | 318 Female offenders  | .88                  |                         |
|            | Skinner & Goldberg, 1986  | 105 Narcotic users  | .74                  |                         |
| DAST-10/20 | Cocco & Carey, 1998       | 97 Psychiatric outpatients with Axis I mental disorder other than substance use or dependence | .92                  | .78 ( $n = 45$ )        |
|            |                           |   | .86                  | .71 ( $n = 45$ )        |
| DAST-10    | Carey et al., 2003        | 1,349 Newly admitted psychiatric patients   | .94; $n = 671$       |                         |
| DAST-A     | Martino et al., 2000      | 194 Adolescents admitted into an adolescent inpatient evaluation and crisis intervention unit | .91                  | .89 ( $n = 42$ )        |

Notes. Internal consistency was measured by coefficient  $\alpha$ .  $n$  is presented in parentheses when it differs from the total  $n$  reported for the study.

the test ranged from 7 to 43 days after the initial test. It was also reported that Item 5 (“Are you always able to stop using drugs when you want to?”), Item 1 (“Have you used drugs other than those required for medical reasons?”), and Item 19 (“Have you ever gone to anyone for help for a drug problem?”) provided the largest sources of instability, which the authors attributed to the fact that these items might be confusing for psychiatric patients who take medications on a regular basis.

DAST-A showed good ( $n = 42$ ,  $r = .89$ ,  $p < .01$ ) 1-week test–retest reliability (Martino et al., 2000).

### 3.4. Factor structure

Table 2 summarizes the factor analytic studies of the four versions of the DAST. Factor analyses of the DAST have been reported in eight studies, which included a broad range of participants of different ages, ethnic groups, and psychological diagnoses (Carey et al., 2003; Cocco & Carey, 1998; El-Bassel et al., 1997; Martino et al., 2000; Salstone et al., 1994; Skinner, 1982; Skinner & Goldberg, 1986; Staley & El-Guebaly, 1990). Factor analyses of DAST-10, DAST-20, and DAST-A have also been conducted (Carey et al., 2003; Cocco & Carey, 1998; Martino et al., 2000; Skinner & Goldberg, 1986).

Three of these studies evaluated DAST-28 (El-Bassel et al., 1997; Skinner, 1982; Staley & El-Guebaly, 1990). Each showed that a single factor accounted for a substantial portion of the total variance. Exploratory factor analysis (EFA) (Skinner, 1982) of a population of individuals who voluntarily sought help at the Clinical Institute of the Addiction Research Foundation identified a single factor that accounted for 45.4% of the total variance. This suggested a unidimensional scale among DAST items. Although four other factors had associated eigenvalues greater than one, the strongest predictor accounted for only 5.4% of the total variation. This led the authors to conclude that the DAST was a unidimensional scale. However, by convention (Kaiser, 1960), factors are retained when eigenvalues are greater than one. Thus, it is important to examine the possibility that the DAST is a five-factor tool.

In a later study of union members at the workplace, El-Bassel et al. (1997) found a five-factor solution. In this study, two items (Items 7 and 20; see discussion of reliability above) were removed because they had poor item–total correlations.

In a study of psychiatric patients, Staley and El-Guebaly (1990) also found a five-factor solution. However, they found that the first unrotated factor accounted for 42.4% of the variance, whereas the second unrotated factor accounted for 7.5% of the variation. The authors concluded that, because the majority of the variance was accounted for by the first factor, the DAST was unidimensional. Interestingly, the factor structure identified in this study differed dramatically from that found by El-Bassel et al. (1997).

EFA identified a five-factor solution for DAST-20 (Skinner & Goldberg, 1986). These five factors accounted for 55% of the total variance in a population of narcotic drug users. Demographic and drug use variables were not correlated with factor scores.

Salstone et al. (1994) analyzed DAST-20 with principal components analysis (PCA) while imposing a four-factor limit. The study participants were a population of female offenders. The four factors accounted for 56% of the variance.

Cocco and Carey (1998) conducted a study of DAST-20 and DAST-10 with psychiatric outpatients. The results of confirmatory factor analysis (CFA) indicated that DAST-20 was not a single-factor instrument. Results from EFA suggested a six-factor solution. All the six factors accounted for 71% of the total variance. However, 41% of the variance was accounted for by Factor 1 and Factors 2–6 accounted for an additional 30%. Additional examination of the data indicated that a two-factor solution may provide the best analysis in this sample, accounting for 49% of the variance. Three factors were identified for DAST-10. Factor 1 accounted 44% of the total variance, whereas Factors 2 and 3 each accounted for 10% of the total variance.

The best support for the unidimensional nature of any of the DAST versions comes from a CFA study of DAST-10 on psychiatric patients in India (Carey et al., 2003). A single-factor (eigenvalue of 6) was identified. All other eigenvalues were below 1.

EFA of the adolescent version of the DAST (DAST-A) suggested a unidimensional factor structure (Martino et al., 2000). The eigenvalue for this factor was 8.64. It accounted for 32% of the variance. Other eigenvalues were not reported.

### 3.5. Validity

#### 3.5.1. Face validity

The DAST is a highly face-valid instrument. That is, the test appears to measure problematic drug use, for which it was designed. As in any instrument that has high face validity, the DAST is very susceptible to faking good. In other words, a test taker who can guess what it is that the test is measuring and who does not want to be known as a problematic drug user may be able to fake one’s answers to appear to have less of a problem. Drug use is a socially undesirable behavior, and most cases of drug use are also illegal. Therefore, people who use drugs may be highly motivated to conceal their drug use, especially in such settings as the workplace, criminal justice system, and clinical settings. Two studies attempted to evaluate the extent of this problem. In the original DAST evaluation, Skinner (1982) correlated the total DAST score with measures of denial and social desirability in two populations. One included people seeking help for drug-related and alcohol-related problems. The other included only people

Table 2  
Factor structure of the DAST

| Version             | Study   | Subjects  | Type of analysis                                   | Rotation used                                     | Factors   | Eigenvalues  | Variance accounted for (%) |      |
|---------------------|---|---|--|---|---|--|----------------------------|------|
| DAST-28             | Skinner, 1982   | 223 Volunteers seeking help for drug and alcohol problems                                     | EFA  | Varimax   | NR  | 12.7   | 45.4                       |      |
|                     |   |   |  |   | NR  | 1.5  | 5.4                        |      |
|                     |   |   |  |   | NR  | 1.3  | NR                         |      |
|                     |   |   |  |   | NR  | 1.2  | NR                         |      |
|                     |   |   |  |   | NR  | 1.1  | NR                         |      |
|                     | El-Bassel et al., 1997  | 176 Union members, including identified drug users and nonusers                               | NR (Questions 7 and 20 were omitted)               | NR  | NR  | Early psychological implications of drug use; acknowledgement and self-recognition of a problem            | 5.99                       | 23.0 |
|                     |   |   |  |   |   | Consequences of long-term use; psychological implications of long-term drug use                            | 3.30                       | 12.7 |
|                     |   |   |  |   |   | Health consequences and illegal activities due to drug use   | 2.92                       | 11.2 |
|                     |   |   |  |   |   | Dependence on substance use; progressive nature of substance use   | 2.85                       | 11.0 |
|                     |   |   |  |   |   | Help seeking by others due to substance use  | 1.32                       | 5.1  |
|                     |   |   |  |   |   | Early psychosocial complications due to drug abuse; acknowledgment and self-recognition of a drug problem. | 11.8                       | 22.5 |
|                     |   |   |  |   |   | Late-onset social consequences   | 2.1                        | 15.3 |
| DAST-20             | Skinner & Goldberg, 1986  | 105 Narcotic users  | EFA  | Varimax   | Treatment and help-seeking behavior   | 1.5  | 13.7                       |      |
|                     |   |   |  |   | Illegal-drug-related activities   | 1.3  | 6.8                        |      |
|                     |   |   |  |   | Inability to control drug use   | 1.2  | 6.0                        |      |
|                     |   |   |  |   | Dependence  | 4.27   | NR                         |      |
|                     |   |   |  |   | Social problems   | 2.03   | NR                         |      |
|                     | Salstone et al., 1994   | 318 Female offenders  | PCA  | Oblique   | Medical problems  | 1.75   | NR                         |      |
|                     |   |   |  |   | Polydrug abuse  | 1.66   | NR                         |      |
|                     |   |   |  |   | Previous treatment  | 1.25   | NR                         |      |
|                     |   |   |  |   | Drug use pattern, family and social problems, medical pathologies, seeking help | 6.49   | 32.5                       |      |
|                     |   |   |  |   | Work  | 1.83   | 9.2                        |      |
| Cocco & Carey, 1998 | 97 Psychiatric outpatients with Axis I mental disorder other than substance use or dependence | CFA indicated a multifactor solution; EFA followed  | NR   | Drug use pattern, aggression, medical pathologies | 1.69  | 8.4  |                            |      |
|                     |   |   |  | Self-control of drug use                          | 1.18  | 5.9  |                            |      |
|                     |   |   |  | External consequences                             | NR  | 41   |                            |      |
| DAST-10             | Cocco & Carey, 1998   | 97 Psychiatric outpatients with Axis I mental disorder other than substance use or dependence | CFA indicated a multifactor solution; EFA followed | NR  | “Can you get through the week without using drugs?”                             | NR   | 30                         |      |
|                     |   |   |  |   | “Are you always able to stop using drugs when you want to?”                     | NR   | NR                         |      |
|                     |   |   |  |   | Eight questions   | NR   | 44                         |      |
| DAST-A              | Martino et al., 2000  | 1,349 Newly admitted psychiatric patients   | CFA  | NR  | “Are you able to stop without a struggle?”                                      | NR   | 10                         |      |
|                     |   |   |  |   | “Do you ever feel bad or guilty about your drug use?”                           | NR   | NR                         |      |
|                     |   |   |  |   | Single factor   | 6.0  | 94                         |      |
| DAST-A              | Martino et al., 2000  | 194 Adolescents admitted into an adolescent inpatient evaluation and crisis intervention unit | EFA  | NR  | Single factor   | 8.64   | 32                         |      |

Note. NR = not reported.

seeking help for drug problems. Both measures were found to be negatively correlated with DAST scores in the sample of people with drug and alcohol problems (denial:  $r = -.28$ ,  $p < .001$ ; social desirability:  $r = -.38$ ,  $p < .001$ ). In other words, participants who tended to deny their drug use tended to report lower DAST scores. Furthermore, participants who desired to present a “socially desirable picture of themselves” also reported lower DAST scores. In the sample that included subjects who exhibited drug but not alcohol problems, only the correlation between social desirability and the total score was found to be significant ( $r = -.31$ ,  $p < .05$ ).

El-Bassel et al. (1997) assessed the relationship between the total DAST score and social desirability in an employment setting, as measured by the Edwards Social Desirability Scale. The correlation between the total DAST score and social desirability was found to be  $-.47$ , a correlation slightly higher than the one observed in the clinical population studied by Skinner.

However, scores on DAST-A in a sample of adolescents admitted into an adolescent inpatient evaluation and crisis intervention unit were not significantly correlated with a measure of social desirability, the Millon Adolescent Clinical Inventory—Desirability scale ( $r = -.11$ ,  $p = .12$ ).

### 3.5.2. Criterion validity

A number of studies examined the relationship between the DAST total score and the score on other measures of drug or alcohol use. It is expected that a tool that measures problematic substance abuse would correlate positively with other tools that measure the same construct. It is difficult to predict how the DAST should correlate with the MAST—a tool designed to measure problematic alcohol use but not drug use. In fact, most studies showed significant positive correlations between the DAST and the MAST total scores ( $r = .59$  in a sample of 176 union members;  $r = .41$  in a sample of 318 female offenders) (El-Bassel et al., 1997; Salstone et al., 1994). There were also significant correlations between the MAST and the DAST in two samples of psychiatric patients ( $r = .45$  and  $r = .52$ ) (Cocco & Carey, 1998; Staley & El-Guebaly, 1990). Two studies report a slight inverse relationship between the DAST and the MAST ( $r = -.21$  in a sample of 223 volunteers seeking help for drug and alcohol problems;  $r = -.19$  in a sample of 501 patients of an alcohol and drug treatment center) (Gavin et al., 1989; Skinner, 1982). Gavin et al. also reported a slight inverse relationship between the DAST total score and the score on the Alcohol Dependence Scale ( $r = -.13$ ). The DAST score was significantly correlated with the Children of Alcoholics Screening Test in psychiatric patients ( $r = .31$ ) and with the Alcohol Use Disorders Identification Test in 143 adults seeking evaluation for ADHD ( $r = .41$ ) (McCann et al., 2000; Staley & El-Guebaly, 1990). There was a significant relationship between the scores on both DAST-20 and DAST-10 and Addiction Severity Index—Drug Composite Score, Clini-

cian Rating Scale for Drug Use, and Addiction Severity Index—Alcohol Composite Score in a sample of psychiatric outpatients (DAST-20,  $r = .42$ ,  $r = .40$ ,  $r = .33$ ; DAST-10,  $r = .39$ ,  $r = .37$ ,  $r = .31$ ) (Cocco & Carey, 1998).

A number of studies examined the relationship between the DAST total score and the frequency of drug use. Skinner (1982) reports a significant correlation between the frequency of drug use in the past 12 months and the DAST score. The correlations range from  $.19$  to  $.55$ , with the strongest correlations with cannabis and barbiturate use and the weakest correlation with heroin use. This is likely due to the different shapes of frequency distributions (i.e., heroin use is much rarer than either marijuana or barbiturate use). Skinner and Goldberg (1986) also report a significant correlation between the DAST total score and the use of marijuana (“ever used”;  $r = .55$ ) and use in the last year ( $r = .31$ ). They also reported a moderate correlation between having ever used hallucinogens ( $r = .35$ ), having ever used stimulants ( $r = .38$ ), and the number of drugs used ( $r = .29$ ), and the total DAST score. However, there was no relationship found between the DAST score and the use of a specific drug in the last year (except for marijuana) and the use of a specific drug in the last 60 days. Gavin et al. (1989) reported a significant moderate correlation between the DAST total score and the number of drugs used during the last week ( $r = .49$ ). Cocco and Carey (1998) reported a significant correlation of the total DAST-20 and DAST-10 scores with days since last drug use ( $r = -.59$ ,  $r = -.58$ ), number of drugs used in the last month ( $r = .38$ ,  $r = .38$ ), and number of drug-related treatments ( $r = .49$ ,  $r = .45$ ).

### 3.5.3. Construct validity

Construct validity is a measure of the appropriateness of inferences drawn from test scores (Cohen & Swerdlik, 2005, p. 175). One way to measure construct validity is to make predictions about how people with certain scores on the DAST should respond on other tests. If the test measures what we believe it to be measuring, then we should be able to make predictions with some degree of accuracy.

Because it has been well established that problematic substance use is correlated with a variety of psychiatric disorders (Achenbach, Krukowski, Dumenci, & Ivanova, 2005), it is reasonable to believe that a test that measures problematic substance use would also be correlated to these constructs. Skinner (1982) found the largest correlations with sociopathic scales of Impulse Expression and Social Deviation ( $r = .42$  and  $r = .54$ ). The DAST was also related to interpersonal problems, persecutory ideas, thinking disorder, depression, and hypochondriasis. Gavin et al. (1989) found a significant correlation between the DAST total score and the score on the Carroll Rating Scale for depression ( $r = .27$ ) and the Beck Depression Inventory ( $r = .25$ ). Cocco and Carey (1998) reported a significant correlation between the DAST score and the Addiction Severity Index—Psychiatric Composite Score ( $r = .34$  for DAST-20 and  $r = .40$  for DAST-10) in psychiatric patients.

Furthermore, low to moderate correlations were found between DAST-20 and DAST-10 scores and the Global Symptom Index, Psychotism, and Phobic Anxiety subscales on Symptom Checklist-90. DAST-10, but not DAST-20, total score was also significantly correlated with depression, anxiety, paranoia, obsessive–compulsive, somatization, and interpersonal sensitivity subscales. DAST-A scores were found to be significantly correlated with scores on the Beck Depression Inventory ( $r = .15$ ), the Suicide Risk Scale ( $r = .22$ ), the Past Feelings and Acts of Violence Scale ( $r = .20$ ), the Alcohol Abuse Involvement Scale ( $r = .49$ ), and the Millon Adolescent Clinical Inventory—Substance Abuse Proneness scale ( $r = .61$ ) (Martino et al., 2000).

### 3.5.4. Discriminative validity

One of the goals of using a screening tool like the DAST is to better enable a practitioner to separate individuals into groups. In the case of the DAST, these groups comprise those who are diagnosed with substance abuse or dependence problems. This requires analysis of the rates of true positives and true negatives, as well as false positives and false negatives, achieved with the use of the instrument. This is frequently achieved by measuring the sensitivity and the specificity of an instrument. The sensitivity of a test reflects its accuracy in identifying diagnosed drug abusers, or the percentage of true positives. Specificity is the rate at which the test correctly identifies nondrug abusers, or the percentage of true negatives. Table 3 summarizes the studies that examined the sensitivity and the specificity of the DAST. The sensitivity of DAST-28 ranges from 80.9% to 96%, using the cutoff score of 6, which was suggested by Skinner (1982) as an optimal cutoff score. DAST-28 specificity, or its true-negative rate, ranged from 71% to 93.9%. Increasing the cutoff threshold usually results in a decrease in sensitivity and an increase in specificity; therefore, some authors suggest a range of possible cutoff scores to be selected by a clinician, depending on the screening purpose (e.g., Gavin et al., 1989; Staley & El-Guebaly, 1990). Using lower cutoff scores from several possible cutoff score ranges results in maximum sensitivity and is recommended for the screening of drug abusers. Using a higher cutoff score results in maximum specificity and can be used to effectively screen for nondrug abusers. The overall accuracy of DAST-28 using the cutoff score of 6 ranged from 70% to 85% (El-Bassel et al., 1997; Gavin et al., 1989; McCann et al., 2000; Staley & El-Guebaly, 1990). Positive predictive power ranged from 23% to 73%, and negative predictive power ranged from 97% to 98% (Gavin et al., 1989; McCann et al., 2000; Staley & El-Guebaly, 1990).

Cocco and Carey (1998) examined the validity of DAST-20 and found sensitivity values that ranged from 89% to 74% as the cutoff score was increased from 2/3 to 5/6. The specificity for DAST-20 ranged from 68% to 83% (the cutoff score used 2/3 to 5/6). The highest hit rate of 81% was achieved at the cutoff score of 5 or 6 (Cocco & Carey, 1998).

For DAST-10, sensitivity ranged from 95% to 41%, and specificity ranged from 68% to 99%, using cutoff scores from 1/2 to 3/4 (Carey et al., 2003). The lowest sensitivity value of 41% was achieved with psychiatric patients in India based on discharge diagnosis. If this lowest sensitivity value and the highest specificity value (99%) derived from the same study are dropped, then the overall range of sensitivity and specificity for DAST-10 is comparable to the corresponding values for DAST-28. Maisto et al. (2000) found negative predictive power for DAST-10 to be  $\geq 95\%$  and positive predictive power to be 28–35% when using a current diagnosis of drug abuse or dependence as a criterion measure. The overall predictive accuracy for diagnosis data was found to be  $\geq 70\%$ . When using occurrence of symptoms for alcohol and other drug use disorders as a criterion measure (people do not meet full criteria for a diagnosis of current substance abuse or dependence disorder), negative predictive values ranged from 90% to 93%, positive predictive values were found to be much higher those for diagnosis data and ranged from 59% to 74%, and overall predictive values ranged from 77% to 87%.

For DAST-A, sensitivity at the cutoff score of 6 was reported at 70% (*Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised [DSM-III-R]*) and 78.6% (*Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition [DSM-IV]*), specificity was reported at 82.4% (*DSM-III-R*) and 84.5% (*DSM-IV*), and positive predictive power was reported at 79% (*DSM-III-R*) and 82.3% (*DSM-IV*) (Martino et al., 2000).

Some studies examined whether the DAST could discriminate between substance abusers and nonsubstance abusers (Cocco & Carey, 1998; Martino et al., 2000; Staley & El-Guebaly, 1990). Staley and El-Guebaly examined the DAST-28 scores of patients admitted to a substance abuse program. These patients were compared to three other groups of psychiatric patients (inpatient program, day hospital, and outpatient anxiety disorder program). DAST scores differed significantly between these four groups. Both DAST-20 and DAST-10 also discriminate between people who are current abusers and people who are former abusers, as well as people who have never met the criteria for drug abuse or drug dependence diagnosis (Cocco & Carey, 1998). Similar results have been reported for DAST-A (Martino et al., 2000). Subjects with drug dependency diagnosis scored higher than those diagnosed with drug abuse without dependence, alcohol abuse or dependence only, or no substance-related disorder (Martino et al., 2000).

## 4. Discussion

As measured by coefficient  $\alpha$ , interitem and item–total correlations, and test–retest reliability, the DAST is a highly reliable instrument. Coefficient  $\alpha$  is the mean of all split half reliabilities (Cronbach, 1951). It is the most common measure

Table 3  
Validity of the DAST by version

| Version    | Study  | Subjects  | Criterion   | % Sensitivity<br>(cutoff score) | % Specificity<br>(cutoff score) |
|------------|--|---|---|---------------------------------|---------------------------------|
| DAST-28    | Gavin et al., 1989<br>Staley & El-Guebaly, 1990<br>McCann et al., 2000<br>El-Bassel et al., 1997 | 501 Patients of an alcohol and drug treatment center  | Psychiatric diagnosis   | 96–78 (5/6–9/10)                | 79–89 (5/6–9/10)                |
|            |  | 250 Psychiatric patients  | <i>DSM-III-R</i> substance abuse diagnosis                      | 96–82 (5/6–10/11)               | 81–91 (5/6–10/11)               |
|            |  | 143 Adults seeking evaluation at an adult ADHD clinic   | Psychiatric diagnosis of substance abuse or dependence          | 85 (6)                          | 71 (6)                          |
|            |  | 176 Union members, including identified drug users and nonusers                               | Questionnaire administered by trained counselors                | 80.9 (6)                        | 93.9 (6)                        |
| DAST-20/10 | Cocco & Carey, 1998  | 97 Psychiatric outpatients with Axis I mental disorder other than substance use or dependence | Psychiatric diagnosis of substance abuse or dependence          | 89–84 (2/3–5/6)                 | 68–83 (2/3–5/6)                 |
| DAST-10    | Maisto et al., 2000  | 162 Psychiatric outpatients with SPMI   | Psychiatric diagnosis of substance abuse or dependence          | 95–74 (1/2–3/4)                 | 68–86 (1/2–3/4)                 |
|            |  |   | Occurrence of symptoms for alcohol and other drug use disorders | 85 (2)                          | 78 (2)                          |
| DAST-A     | Carey et al., 2003<br>Martino et al., 2000   | 1,349 Newly admitted psychiatric patients in India  | Discharge diagnosis of substance use disorders                  | 80 (2)                          | 88 (2)                          |
|            |  | 194 Adolescents admitted into an adolescent inpatient evaluation and crisis intervention unit | <i>DSM-IV</i> diagnosis of substance abuse or dependence        | 41 (3)                          | 99 (3)                          |
|            |  |   |   | 78.6 (6)                        | 84.5 (6)                        |

Notes. Percent sensitivity refers to the proportion of true positives identified in the study. Percent specificity refers to the proportion of true negatives identified in the study. The numbers in parentheses indicate the cutoffs used in each study. As cutoff score is increased, sensitivity decreases whereas specificity increases. SPMI = severe and persistent mental illness.

of internal consistency. A high coefficient  $\alpha$  suggests a homogenous test. However, a value of more than .90 may indicate redundancy (Steiner, 2003). The majority of the studies that have reported coefficient  $\alpha$  for the DAST have found that value to be close to .90, which suggests that the DAST is a highly homogeneous test. Both item–total and interitem measures of reliability of the DAST tend to support this point. However, some items are clearly better predictors than others. Those items that had the weakest association with other test items and test total (Items 7 and 20) were left out of the alternate versions of the DAST, which may make those tests more reliable.

The factor structure of the DAST has been somewhat more difficult to understand than the instrument's reliability. EFA has tended to provide a five-factor solution. However, most of the variance of the tool has typically been accounted for by a single factor. This has led most authors to conclude that the DAST is a single-factor instrument. Factor analysis, by nature, is highly unreliable. Of the factor analytic studies included in this review, seven of eight had sample sizes between 97 and 318 subjects. Tabachnick and Fidell (1996) report that the reliability of factor analysis varies with sample size. According to them, a study of 100 individuals would yield factors with an estimated fair reliability, whereas a study of 300 is considered good. One thousand subjects are required for excellent reliability (only one study in our sample had more than a thousand subjects).

The single-factor theory is supported by high coefficient  $\alpha$ , interitem, and item–total correlations that have been reported for the various versions of the DAST. However, in light of the controversy on the multifactorial nature of the DAST, we must wonder how much meaning we can attribute to conclusions derived from item–total correlations. This is an area in which more research with larger sample sizes is needed.

The test–retest reliability for DAST-28, DAST-20, and DAST-A has only been measured for a period of several weeks. Consistently high scores suggest that these instruments yield relatively stable results over time, but a coefficient of stability (reliability in 6 months or more) has not yet been determined.

Consistently low item–total correlations for the questions “Do you limit your drug use to certain situations?” and “Have you ever been arrested for driving while under the influence of drugs?” may be a reason to remove these items from DAST-28. These items were, in fact, not included in DAST-20/10. Low item–total correlations have also been found in studies of psychiatric patients for the items “Can you get through the week without using drugs other than those required for medical reasons?” and “Are you always able to stop using drugs when you want to?” For this reason, it may be appropriate to remove or discount these items when using the DAST to screen psychiatric populations.

The high degree of face validity may be problematic for the DAST. Although a high face validity is a desirable trait

for an assessment tool under normal circumstances, this may not be the case when assessing a socially undesirable trait. A good face validity is an indicator that an instrument is feasible for use within the population in which it is being used. However, a good face validity also means that the individual taking a test can guess what the items are intending to measure. If there is motive to fake good, such as in cases that involve the criminal justice system, a respondent may not be entirely truthful with one's answers. This has been observed in the negative correlations between DAST score and measures of denial and social desirability. This may not be a problem for DAST-A. Understanding interactions between factors that influence the validity of self-reporting and score on the DAST is another direction for further research.

Other measures of validity have been satisfactory. Criterion validity has been shown by correlating the DAST with a variety of other devices that measure problematic drug use. Construct validity has been shown by correlating the DAST with a variety of measures of psychopathology. Discriminative validity has been observed in high values for both sensitivity and specificity. The majority of studies on the validity of the DAST have been conducted on clinical populations. Another area of future research may attempt to expand the utility of the DAST by measuring its validity in nonclinical populations.

Although the sensitivity of the DAST is usually quite high, it varies significantly according to the group being studied. Such groups have included patients not identified as substance abusers (McCann et al., 2000), psychiatric inpatients (Carey et al., 2003; Staley & El-Guebaly, 1990), psychiatric outpatients (Maisto et al., 2000), people being screened for drug/alcohol problems (Gavin et al., 1989), or nonsubstance-abusing hospital patients (El-Bassel et al., 2003). To obtain maximum sensitivity, a lower cutoff score from a possible cutoff score range is recommended when screening for drug abusers, and a higher cutoff score is recommended when screening for nondrug abusers. The specificity of the DAST is increased when the cutoff score is high and, as a result, sensitivity decreases. Clinicians should select what cutoff scores to use according to the screening purpose (Carey et al., 2003; Cocco & Carey, 1998). Taken together, these findings suggest that an important direction for future research on the DAST instrument needs to include cross-cultural components. These may include developing versions of the DAST specifically for certain populations or developing cutoffs for specific populations.

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