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A modified version of the Drug Abuse Screening Test among undergraduate students

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Abstract

The present study assesses the prevalence of items from a modified version of the Drug Abuse Screening Test, Short Form (DAST-10) for substances other than alcohol among undergraduate students. More than 4,500 undergraduate students at a large Midwestern research university completed a web-based survey in 2005. Nearly 1 every 10 undergraduate students experienced three or more DAST-10 items in the past 12 months. Although the prevalence of illicit drug use did not differ by gender, undergraduate men were significantly more likely than women to report DAST-10 items. Less than 6% of individuals who reported three or more drug DAST-10 items had ever used treatment services for substance use. As a brief screening instrument, the DAST-10 offers promise for detecting possible drug abuse among college students. Based on the prevalence of drug use, colleges and universities are encouraged to provide screening opportunities to identify and to provide services for students at high risk for drug abuse.

Keywords

Drug Abuse Screening Test; Brief screening instrument; Substance abuse; College students; Illicit drugs; Prescription drugs

1. Introduction

Substance abuse is the number one public health problem for U.S. colleges and universities because it represents the leading cause of preventable death and injury among collegians ages 18–25 years (Hingson, Heeren, Winter, & Wechsler, 2005; Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002; Perkins, 2002; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). Although the majority of these abuses appear alcohol-related, college students also experience severe consequences as a result of illicit drug use or coingestion of alcohol and other drugs (e.g., Chronicle of Higher Education, 2000; Indiana University of Pennsylvania, 2005; San Diego Tribune, 2005; USA Today, 2005). During the past decade, the use of marijuana and other illicit drugs has increased considerably among college students, whereas alcohol use has held relatively steady during this same period (e.g., Gledhill-Hoyt, Lee, Strote, & Wechsler, 2000; Johnston, O'Malley, Bachman, & Schulenberg, 2004; Mohler-Kuo, Lee, & Wechsler, 2003; Strote, Lee, & Wechsler, 2002).

Epidemiological research indicates young Americans 18–29 years are the most likely to use marijuana or other illicit drugs relative to other age groups (Compton, Grant, Collover, Glantz,

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& Stinson, 2004; Johnston et al., 2004; Substance Abuse and Mental Health Service Administration [SAMHSA], 2004). College students are more likely than their noncollegiate peers to report some type of drug use and misuse (Johnston et al., 2004; SAMHSA, 2003). For example, U.S. college students report rates of illicit use of methylphenidate (Ritalin) that are higher than those of their peers not attending college (Johnston et al., 2004). In addition, college students are more likely than their peers not attending college to report driving under the influence of illicit drugs in the past year (SAMHSA, 2003). Although many college settings may present opportunities that contribute to experimentation with certain types of drug use behaviors, it is also important to note there can be considerable differences among colleges in the prevalence of drug use (e.g., Bell, Wechsler, & Johnston, 1997; Gledhill-Hoyt et al., 2000; McCabe, Knight, Teter, & Wechsler 2005; Strote et al., 2002). For example, a national study analyzing random samples of students from a nationally representative sample of U.S. colleges found the past 30-day prevalence rates of marijuana use to range from 0% (at the lowest-use school) to 46% (at the highest-use school) (Gledhill-Hoyt et al., 2000).

Previous epidemiological research has examined the prevalence of drug use other than alcohol among college students (Gledhill-Hoyt et al., 2000; Johnston et al., 2004; Presley, Meilman, & Cashin, 1996); however, much less attention has been given to drug abuse. In stark contrast to the numerous brief instruments readily available to screen for possible alcohol abuse, such as the CAGE and Alcohol Use Disorders Identification Test (Aertgeerts et al., 2000; Ewing, 1984; Fleming, Barry, & MacDonald, 1991; Heck & Williams, 1995; O'Hare & Tran, 1997; Saunders, Aasland, Babor, de le Fuente, & Grant, 1993), relatively few standardized screening instruments that screen for drugs other than alcohol among college students exist.

1.1. Study objectives

Despite the increasing rates of illicit drug use among college students for the past decade (Bell et al., 1997; Gledhill-Hoyt et al., 2000; Johnston et al., 2004; Mohler-Kuo et al., 2003), there is a paucity of research assessing possible drug abuse. There is also a lack of information regarding screening instruments that may be used to detect possible drug abuse (other than alcohol) among college students. One screening test that could be considered for this population is the Drug Abuse Screening Test, Short Form (DAST-10), a brief screening instrument that can be used in clinical and nonclinical settings to detect possible substance abuse problems associated with the use of a wide variety of drugs other than alcohol (Skinner, 1982a; 1982b).

The main objectives of this study were (1) to assess the prevalence of items from a modified version of the DAST-10 brief screening instrument among undergraduate students, and (2) to examine the associations between a modified version of the DAST-10 and the number of drugs used in the past year, frequency of drug use, and age of initiation of drug use.

2. Materials and methods

2.1. Design and sample

The Institutional Review Board approved the study protocols, and each participant provided informed consent online. The present study was conducted during a 2-month period in January and February 2005, drawing on a total undergraduate population of 20,138 full-time students (10,339 women and 9,799 men). A simple random sample of 5,389 full-time undergraduate students was drawn from the total undergraduate population via the Registrar's Office. In addition, 652 Hispanic, 634 African American, and 244 Asian undergraduate students were selected using stratified random sampling. A web-based survey method was employed because similar methods have been shown to be feasible for research on the use of alcohol and other drugs among college students (see Boyd, McCabe, & d'Arcy, 2003; Kypri, Gallagher, & Cashell-Smith, 2004; McCabe, 2004; McCabe, Boyd, Couper, Crawford, & d'Arcy, 2002).

The entire sample was mailed a notification letter describing the study, along with a US\$2.00 prepayment. Potential participants were invited to self-administer the Student Life Survey (SLS) by clicking on a link to access the web survey and by using a unique password. The web survey was maintained on an Internet site running under a secure socket layer protocol to ensure privacy and security. Nonrespondents were sent up to three reminder e-mails. By participating in the survey, students became eligible for sweepstakes prizes, which included cash prizes, travel vouchers, field passes to athletic events, and iPods.

The final response rate was 66%, which exceeded the average response rate for national college-based alcohol and other drug studies (Wechsler et al., 2002). Compared to responders, the nonresponders were more likely to be male and non-White, but they did not differ in terms of age. To examine the possibility of nonresponse bias, we conducted a short telephone follow-up survey with a randomly selected sample of 750 students who did not respond to the original web survey, and 159 students responded. The demographic characteristics of the 159 students who responded to the telephone survey were compared with the 591 nonrespondents who did not complete the telephone survey; there were no significant differences in terms of gender, race, age, and class year. There were no significant differences in the prevalence rates of 12-month alcohol use, binge drinking, 30-day cigarette smoking, and other problem health behaviors between respondents and nonrespondents. The proportion of respondents who completed the entire survey (completion rate) was 97.4%. Similar web-based study designs and procedures are described in more detail elsewhere (McCabe, 2004; McCabe et al., 2002).

2.2. Instrument and measures

The SLS includes items from several national studies on the use of alcohol and other drugs (e.g., Johnston, O'Malley, & Bachman, 2003; Wechsler, Dowdall, Davenport, & Rimm, 1995). Demographic measures in the survey included questions about gender, race/ethnicity, class year, living arrangement, and fraternity and sorority membership.

Illicit drug use was assessed with the following question: "On how many occasions in the past 12 months have you used the following types of drugs not prescribed to you?" Marijuana or hashish, cocaine, LSD, other psychedelics, crystal methamphetamine, heroin, inhalants, ecstasy, sleeping medication (e.g., Ambien, Halcion, Restoril, temazepam, triazolam), sedative/anxiety medication (e.g., Ativan, Xanax, Valium, Klonopin, diazepam, lorazepam), stimulant medication (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate), and pain medication (i.e., opioids such as Vicodin, OxyContin, Percocet, Darvocet, morphine, hydrocodone, oxycodone). The response scale for each drug is as follows: 1 = *no occasion*; 2 = *1–2 occasions*; 3 = *3–5 occasions*; 4 = *6–9 occasions*; 5 = *10–19 occasions*; 6 = *20–39 occasions*; 7 = *40 or more occasions*.

Age of initiation of drug use was measured with the following question: "How old were you when you first started using each drug?" The drugs assessed were the same as those listed for illicit drug use. The response scale for each drug is as follows: 1 = *Grades K–4*; 2 = *Grades 5–6*; 3 = *Grades 7–8*; 4 = *Grades 9–10*; 5 = *Grades 11–12*; 6 = *college*.

DAST-10 is a brief screening instrument used to assess possible abuse of drugs other than alcohol in the past 12 months. Using web-based skip logic, respondents who reported any past year illicit drug use received DAST-10 items. Respondents were instructed that DAST-10 questions were about drugs other than alcohol, and they were instructed to answer "yes" or "no" to each of the DAST-10 items. Respondents were informed that *drug* refers to the use of prescription drugs not prescribed to the respondent, or the use of prescription drugs in a manner not intended by the prescribing clinician, or the use of other drugs such as marijuana, cocaine, LSD, ecstasy, and others. The DAST-10 items used in this study are listed in Table 1.

The DAST was originally modified based on the Michigan Alcohol Screening Test, and the two scales have very similar properties. Developed in North America, the DAST is a well-validated instrument that has been shortened to a 20-item version (DAST-20) and a 10-item version (DAST-10), both of which have been shown to have similar psychometric properties and acceptable internal consistencies (Cronbach's $\alpha > .85$) and test-retest reliabilities ($r > .70$). Furthermore, the DAST-10 and the DAST-20 correlated (.97) with each other (Cocco & Carey, 1998). The DAST-10 has been shown to have good internal consistency (Cronbach's $\alpha = .86$), temporal stability (test-retest intraclass correlation coefficient = .71), and the ability to identify individuals who need more intensive assessment for substance abuse problems (Cocco & Carey, 1998). Coefficient α for the DAST-10 in this study was .68. Based on previous research, we used a cutpoint score of 3 because this cutpoint has shown the best balance between sensitivity and specificity (Cocco & Carey, 1998; French, Roebuck, McGeary, Chitwood, & McCoy, 2001; Maisto, Carey, Carey, Gordon, & Gleason, 2000).

Treatment services for substance use was assessed with the following question: "Have you ever used treatment services for alcohol or other drugs?" The response scale was as follows: 1 = *yes*; 2 = *no*.

2.3. Data analysis

For purposes of analysis with the final overall sample, data were weighted based on race/ethnicity and gender to account for the overall student population sampling fractions. The weight variable was centered (normalized) to ensure that the sample size remained the same after weighting. Associations between categorical variables were tested using chi-square and logistic regression analysis. One-way analysis of variance (ANOVA) was used to compare different levels of drug use across DAST-10 total mean scores. Post hoc pairwise comparisons were conducted using Tukey's Honestly Significant Difference test to maintain an $\alpha = .05$. Correlational analyses were conducted to examine the associations between DAST-10 scores, frequency of illicit drug use, and age of drug use onset. Procedures outlined by Cohen and Cohen (1983) were used to test for differences between independent correlations. The correlations were transformed using Fisher's transformation $z(r)$, and the standard error of each was computed as $S_z = 1 / \sqrt{(N - 3)}$. The difference between samples was tested using a normal theory test (expressed using the letter z). The test statistic is $[z(r_1) - z(r_2)] / \sqrt{(S_{z1}^2 + S_{z2}^2)}$, and it is reported as a z test.

2.4. Sample

The final overall sample consisted of 4,580 undergraduate students (3,639 from the random sample and 941 from oversampling). There was an equal gender mix in the sample, and the mean age was 19.9 years ($SD = 2.0$). The racial/ethnic distribution of the sample was as follows: 65% White, 13% Asian, 7% African American, 5% Hispanic, and 10% other categories.

3. Results

3.1. Prevalence rates of illicit use of drugs and the DAST-10: overall sample

The 12-month prevalence of any illicit use of drugs other than alcohol for the overall sample was 39%. The 12-month prevalence of any illicit use of drugs did not differ by gender (38% women and 39% men). As illustrated in Table 1, the 12-month prevalence of reporting at least one DAST-10 item for the overall sample was 33%, that of reporting two or more DAST-10 items was 19%, and that of reporting three or more DAST-10 items was 10%. In addition, less than 6% of undergraduate students who reported three or more DAST-10 items had ever used treatment services for substance use in their lifetime.

After adjusting for race/ethnicity, class year, living arrangement, and fraternity/sorority membership, multivariate logistic regression analysis found that men were 1.4 times more likely than women to report two or more DAST-10 items (OR = 1.4, 95% CI = 1.2–1.6, $p < .01$). For undergraduate women and men, the five most prevalent DAST-10 items in the past 12 months were as follows: (1) using drugs other than those required for medical reasons; (2) feeling bad or guilty about drug use; (3) using more than one drug at a time; (4) not being able to stop drug use; and (5) engaging in illegal activities to obtain drugs. Undergraduate men were significantly more likely than women to experience four of the five most prevalent DAST-10 items.

3.2. Prevalence rates of the DAST-10: drug users

Among past year drug users ($n = 1,735$), 85.6% reported at least one DAST-10 item, 49.2% reported at least two or more DAST-10 items, and 25.0% reported three or more DAST-10 items. The same DAST-10 items that were more prevalent in the overall sample were also significantly higher among past year drug users. In addition, the same gender differences found in the overall sample were also present among drug-using students.

3.3. DAST-10 mean score based on the number of illicit drugs used in the past year

For both undergraduate men and women, the mean DAST-10 score was higher as a function of the number of illicit drugs used in the past year. Overall, the mean (*SD*) DAST-10 score for individuals who used one drug in the past year was 1.4 (1.2), for those who used two drugs was 2.3 (1.5), and for those who used three or more drugs was 3.6 (2.1). ANOVA results showed a significant effect for the number of drugs used in the past year, $F(2, 1719) = 246.51$, $p < .001$, and the differences in mean DAST-10 scores were each statistically significant from another based on post hoc tests (all $ps < .05$).

3.4. Association between the DAST-10 and frequency of illicit drug use

Correlational analyses showed that the DAST-10 was positively and significantly related to the past 12-month frequency of drug use for 7 of 12 drugs, including pain medication ($r = .13$, $p < .01$), stimulant medication ($r = .15$, $p < .01$), sedative/anxiety medication ($r = .16$, $p < .05$), other psychedelics ($r = .21$, $p < .01$), cocaine ($r = .26$, $p < .01$), ecstasy ($r = .26$, $p < .01$), and marijuana ($r = .46$, $p < .01$). As described in the Data Analysis section, we used procedures outlined by Cohen and Cohen (1983) to test the hypothesis that the correlations between the DAST-10 and the past 12-month frequency of drug use are statistically significantly stronger for men than for women. No significant gender differences in the correlations were observed.

3.5. Association between the DAST-10 and age of initiation of illicit drug use

Analyses of age of onset showed that the DAST-10 was negatively and significantly related to age of onset for marijuana use ($r = -.30$, $p < .01$) and age of onset for stimulant use ($r = -.13$, $p < .05$), and was marginally and negatively correlated with age of onset for other psychedelics ($r = -.11$, $p = .06$) and with age of onset for LSD ($r = -.18$, $p = .06$). We tested the hypothesis that the correlations between the DAST-10 and age of onset of drug use are stronger for men than for women. Results showed that the correlation between the DAST-10 and age of onset for cocaine use was significantly stronger for women than for men ($z = 2.68$, $p < .01$). No gender differences in the other correlations were observed.

4. Discussion and conclusions

The present study found that approximately 1 in every 10 undergraduate students reported three or more DAST-10 items in the past year from using a substance other than alcohol. However, less than 6% of undergraduate students who reported three or more DAST-10 items had ever

used treatment services for substance abuse. These findings suggest that institutions of higher education may need to provide opportunities for screening to detect students at risk for drug abuse. More importantly, additional efforts are needed to ensure that adequate assessment, monitoring, and treatment options are available for those individuals at risk for drug abuse.

The findings of this study revealed some important gender differences. Although the 12-month prevalence of any illicit use of drugs other than alcohol did not differ as a function of gender, undergraduate men were significantly more likely than women to report DAST-10 items. Previous studies have found that DAST results are not correlated with gender (Martino, Grilo, & Fehon, 2000; Skinner & Goldberg, 1986; Staley & El-Guebaly, 1990). However, gender differences in illicit drug use behaviors among college students suggest the need to examine possible gender differences in drug abuse (e.g., Johnston et al., 2004; McCabe, Knight, et al., 2005; McCabe, Schulenberg, et al., 2005).

We found that 9% of the overall sample and 23% of illicit drug users reported using more than one drug at a time in the past 12 months. These prevalence rates are alarming in light of the consequences associated with polydrug use. For example, more than half (54%) of drug-related emergency department visits in 2002 involved two or more substances, providing evidence for the increased risk associated with polydrug use (SAMHSA, 2004). The simultaneous use of substances may conceal the effects of an individual drug due to drug interactions, failing to signal high levels of intoxication or potential overdose to the user (Earleywine & Newcomb, 1997). The present study also found that past year polydrug users reported significantly higher mean scores on the DAST-10, which adds to a growing body of evidence for a positive relationship between polydrug use and drug abuse (Stephens, Roffman, & Simpson, 1993).

As expected, results showed that the past 12-month frequency of illicit drug use—particularly marijuana use—was positively associated with DAST-10 scores. Positive associations between the frequency of use of psychedelics, cocaine, and ecstasy and DAST-10 scores were also observed. Findings also showed that earlier age of onset of marijuana and psychedelic use was predictive of DAST-10 scores for male and female students, whereas early-onset cocaine use among women was associated with the DAST-10. These findings indicate that college students using these substances at an earlier age are at increased risk for subsequent development of drug abuse. These results mirror those from studies of early-onset alcohol and drug use (e.g., Grant & Dawson, 1997, 1998; Grant, Stinson, & Harford, 2001; Muthen & Muthen, 2000) and highlight the importance of early drug prevention efforts.

4.1. Implications for practice

The finding that 1 in every 10 undergraduate students surveyed reported three or more DAST-10 items in the past 12 months clearly demonstrates a need for increased substance abuse assessment and treatment among undergraduate college students. This need is further supported by the fact that, among those individuals who reported three or more DAST-10 items in the past 12 months, fewer than 6% had ever used treatment services for substance abuse. Thus, the challenge in this population lies in identifying those students who may be in need of services and in assessing the severity of the problem (given early-onset indicators) to recommend the appropriate level of treatment. The burden of assessment and referral rests on those who have contact with students in environments most likely to have the desired outcome (i.e., acceptance of a referral); typically, this will be health care or health-care-related settings such as counseling centers, health centers, hospitals, and other clinics that see college students. However, others on campus could be in positions to identify those in need of services, including hidden populations less likely to be detected, such as minorities and women. Furthermore, additional opportunities for substance abuse detection are often presented to those managing and monitoring academic and nonacademic discipline cases, sports teams, social fraternities and sororities, and campus residence halls. With limited effort, all of these settings include

personnel who could be trained in detection and referral strategies. Interestingly, the second most frequently cited DAST-10 item in this study was “feeling bad or guilty about drug use”—a factor that could potentially serve to heighten referral acceptance and treatment motivation.

Although some college health centers currently screen for alcohol abuse, the findings of this study suggest that colleges and universities should also provide screenings for abuse of drugs other than alcohol. The DAST-10 may be a useful initial screening instrument for the detection of potential problematic illicit drug use among college students. For example, brief drug screening using the DAST-10 (or similar instruments) could be administered by health professionals during face-to-face visits. Furthermore, such brief screening instruments can be made available online for self-administration, and problematic scores can be referred for a more in-depth assessment.

4.2. Strengths and limitations, and future research

The present study has several strengths that build upon past research examining drug use among college students. First, the study featured a brief screening instrument that has proven reliability and validity in clinical and nonclinical populations. Second, this study focused on a wide range of drugs other than alcohol, which represents an understudied topic among college students. Finally, there were an adequate number of undergraduate women and men for the assessment of gender differences.

The current study also has some limitations that should be taken into account while considering the implications of the findings. The cross-sectional nature of the data precludes determination of the mechanisms underlying the observed associations. There is a great deal of variation between rates of illicit drug use across U.S. college campuses (e.g., Gledhill-Hoyt et al., 2000; McCabe, Knight, et al., 2005); thus, caution should be exercised when generalizing our findings to a larger population of college students. However, despite this limitation, our findings provide strong evidence that studies with college-age samples should include measures to assess drug use and abuse for substances other than alcohol. Colleges and universities with traditional-age students are advised to add such measures because college students and young adults between 18 and 29 years appear to be more likely than other age groups to meet criteria for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* alcohol abuse or dependence diagnoses, and marijuana abuse or dependence (e.g., Compton et al., 2004; Dawson, Grant, Stinson, & Chou, 2004; Knight et al., 2002). Finally, the DAST-10 does not cover all of the problems that are known to be related to drug use, including some *DSM-IV* criteria. Although the DAST-10 has been used in clinical and nonclinical settings, it has not been used widely in college populations. Despite the limitations, the DAST-10 is a promising screening instrument for detecting possible drug abuse among college students. Further validation of the DAST-10 using survey research and standard clinical interviews is needed to confirm optimal cutpoints for sensitivity and specificity among college students. Related research needs to compare rates of *DSM-IV* drug use disorders between young adults in college and those not attending college because the rates of alcohol dependence have been shown to be higher for college students (e.g., Dawson et al., 2004).

Past college-based longitudinal studies have shown that many forms of drug use tend to increase during the transition from high school to college and then decline as students graduate and assume postcollege responsibilities (e.g., Johnston et al., 2004; Schulenberg et al. 2001; Sher & Gotham, 1999). However, more prospective longitudinal studies are needed to examine whether these findings also apply to the course of drug use disorders among college students. Such longitudinal efforts would help advance theory regarding the epidemiology of drug abuse during the transition from adolescence through young adulthood and would shed light on the long-term implications of drug abuse in college.

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Table 1
Prevalence and gender differences in DAST-10 items (overall sample, $N = 4,505$)

DAST-10 items	Total sample ($N = 4,505$) (%)	Women ($n = 2,271$) (%)	Men ($n = 2,234$) (%)	Sex differences [χ^2 (df) p]
Have you used drugs other than those required for medical reasons?	28.3	26.7	30.0	5.9 (1) $p < .05$
Have you used more than one drug at a time?	8.9	6.9	11.0	23.3 (1) $p < .001$
Are you always able to stop using drugs when you want to? ^a	5.6	5.1	6.0	<i>ns</i>
Have you had blackouts or flashbacks as a result of drug use?	4.1	4.0	4.2	<i>ns</i>
Have you ever felt bad or guilty about your drug use?	12.4	10.7	14.2	12.0 (1) $p < .01$
Have family members ever complained about your involvement with drugs?	3.2	2.4	4.0	8.4 (1) $p < .01$
Have you stayed away from your family because of your drug use?	2.6	2.3	3.0	<i>ns</i>
Have you engaged in illegal activities to obtain drugs?	4.8	3.7	5.9	12.6 (1) $p < .001$
Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?	1.8	1.8	1.7	<i>ns</i>
Have you had medical problems as a result of your drug use (e.g., memory loss, hepatitis, convulsions, and bleeding)?	1.2	1.3	1.2	<i>ns</i>
At least one drug-use-related problem	32.9	30.8	35.0	8.7 (1) $p < .01$
At least two drug-use-related problems	18.9	16.4	21.5	19.2 (1) $p < .001$
At least three drug-use-related problems	9.6	7.8	11.5	17.5 (1) $p < .001$

Note. *ns* = Not significant.

^aPrevalence indicates the percentage of respondents who indicated a “no” response.