

DOES PRE-EMPLOYMENT DRUG USE PREDICT ON-THE-JOB SUITABILITY?

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Drug testing is increasingly used in the screening of applicants for employment. Despite the growth of drug testing, there is little research that examines the value of pre-employment drug-use information in the prediction of post-employment suitability. This research, which was based on a sample of 10,188 young adults, examined the criterion-related validity of pre-employment drug-use information. For all drugs examined, the greater the frequency of use and the earlier the age at which the drug was first used, the greater the probability of a person being classified as unsuitable after hire. However, the operational validity of each drug variable was influenced by the base rate of drug use. The low base rates for some drugs make their operational validity of limited value. The operational validity of the marijuana frequency-of-use measure (.07) was approximately equal to that of less frequently used drugs (e.g., stimulants and depressants). No strong moderators of the validity of a drug-composite measure were found.

Drug use in the work place is a subject of growing concern. It has been estimated that about one-half of work place injuries and nearly 40% of work place deaths are attributed to drug or alcohol use. While compelling data are lacking, it is estimated that about two-thirds of the people entering the work force have used illegal drugs (Tyson & Vaughn, 1987). In response to concerns about drugs in the work place, pre-employment drug testing has become more prevalent among employers (Lindquist, 1988).

Although the reliability of drug-testing methods is receiving increasing attention (Council on Scientific Affairs, 1987), little research has examined the criterion-related validity of pre-employment drug use as a predictor of employment suitability. Kagel, Battalio, and Miles (1980; also see Miles, Battalio, Kagel, & Rhodes, 1975) examined the relationship between marijuana use and job performance in an "experimental microeconomy." The

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volunteer subjects lived and worked for 98 days in wings of a hospital facility where they earned money by performing manual labor tasks that were paid for on a piecework basis. Access to almost all consumer goods during the experiment, including food, was through income earnings. Marijuana had no effect on work output or hours worked, although subjects preferred leisure time activities after marijuana use. Kolb, Nail, and Gunderson (1975) examined 903 Navy enlisted personnel to determine the relationship between pre-employment drug use and in-service drug use and job performance. The subjects were drawn from those who had been granted amnesty from prosecution for illegal drug use and admitted to a drug rehabilitation center. After being admitted to the rehabilitation center, the subjects provided self-report data on their pre-service drug use. The subjects were provided assurances regarding the anonymity and confidentiality of the data provided. Those who reported pre-service drug use advanced less rapidly in pay grade, incurred more disciplinary actions, and were more likely to use heroin while in the military service. The findings of neither the Kagel et al. (1980) nor the Kolb et al. (1975) studies display much external validity for the question of the effects of pre-employment drug use on employment suitability. The former study did not measure pre-employment drug use and used an artificial work setting. The latter study suffered from subject selection contaminants and the collection of pre-employment drug use under anonymous conditions, which failed to mirror the testing conditions in a pre-employment situation. To attempt to address the research gap on the drug-use/suitability issue, the present study provides large-sample evidence addressing the usefulness of pre-employment drug-use information in predicting on-the-job suitability.

In the present research, self-report survey data were used as the source of the pre-employment drug-use information. The use of self-report data has a long history in personnel psychology, and these data have proven to be effective predictors for a variety of performance domains (Owens, 1976). Several authors have reviewed the accuracy of self-reported usage of illegal drugs (Brown, 1974; Brown & Harding, 1973; Harrell, 1985; Nurco, 1985; Rouse, Kozel & Richards, 1985). To obtain accurate self-reported drug-use information, several conditions are necessary. First, the respondent must know what drug was consumed. Illegal drugs are often distributed using colloquial names (e.g., "black beauties" for amphetamines). If the drug names used in the self-report questions are not familiar to the respondent, an inaccurate response is probable. Furthermore, illegal drugs may be misrepresented (e.g., LSD may be sold as mescaline), such that the respondent does not know the name of the drug consumed. A second condition for accurate reporting is that the respondent must remember the drug-usage information solicited by the question. Respondents may not accurately recall the frequency of drug consumption or the age at which

they began the use of a drug. Third, respondents must be willing to report illegal drug use. Respondents can be expected to minimize or deny their socially undesirable behaviors. While some authors have reported problems with respondents over-reporting their drug use (Petzel, Johnson, & McKillip, 1973), it is reasonable to expect that most job applicants would be motivated to under-report their drug use.

Self-report measures can be contrasted with physiological measures (e.g., urinalysis) of drug use. While the accuracy of physiological measures of drug use is a matter of continuing debate, clearly the effectiveness of physiological measures available at present is restricted to identifying recent (e.g., days or weeks) drug use that leaves residual chemical markers in the user's body (American Federation of Labor and Congress of Industrial Organizations, 1987; Rosen, 1987). Thus, the physiological measures available to date have no value in identifying historical patterns of drug use. While self-report drug-use measures are subject to the respondent's intentional and unintentional distortions, they represent the only available method of obtaining historical data on the respondent's use of drugs.

Method

The drug-use items were included in the military's Educational and Biographical Information Survey (EBIS) (Means & Perelman, 1984). During the spring of 1983, the EBIS was administered to approximately 34,800 applicants for the four military services. Those military applicants who entered the military service within one year of completing the EBIS were defined as the study sample ($N = 10,188$). Ten drug-use items were available. These items covered the age at which one first used (1) marijuana and (2) hard drugs, (3) whether one had been arrested or convicted of a drug-related offense, and the frequency with which one had used, without a prescription by a doctor, the following drugs: (4) marijuana, (5) heroin, (6) cocaine, (7) stimulants, (8) depressants, (9) other narcotics, and (10) other drugs. The two questions concerning age at first drug use had response alternatives of "age 14 or younger," "age 15-17," "age 18 or older," "I never did this," and "don't recall age." For this variable, the response option "don't recall age" was considered a missing datum. Response option "I never did this" was placed at the older end of the age scale. The drug-related arrest question had response alternatives of "never arrested," "arrested," and "convicted." The response scale for the seven drug-frequency items had six response categories ranging from "never used" to used "50 times or more."

The employment unsuitability measure was defined as discharge from military service for reasons classified as "failure to meet minimum behavioral or performance criteria" on or before September 30, 1987. This

TABLE 1
*Means, Standard Deviation, Percent Missing, and Reliability
 of Drug Measures*

Variable	<i>N</i>	Mean	<i>SD</i>	% Missing	Reliability
Age marijuana use	9,411	3.24	1.05	7.6	.60
Age hard drug use	9,449	3.94	.31	7.3	.33
Drug arrest	9,456	1.02	.16	7.2	.73
Frequency of					
Marijuana	9,355	.86	1.38	8.2	.54
Heroin	9,207	.01	.12	9.6	-.01
Cocaine	9,224	.07	.40	9.5	.23
Stimulants	9,286	.23	.73	8.9	.41
Depressants	9,267	.09	.43	9.0	.25
Other narcotics	9,261	.03	.24	9.1	.16
Other drugs	9,262	.04	.31	9.1	.30
Unsuitability discharge	10,188	.16	.37	0.0	NA

Note: For the age items, a response of "age 14 or younger" was coded 1; "age 15-17" was coded 2; "age 18 or older" was coded 3; "never used" was coded 4. A mean score on the age item near 3.0 indicates that the mean response was approximately "age 18 or older." For the drug-arrest item, a response of "never arrested" was coded 1; "arrested" was coded 2; "convicted" was coded 3. A mean score of 1 indicates that the average response was "never arrested." For the seven drug-frequency items, a response of "never" was coded 0; "1-4 times" was coded 1; "10-24 times" was coded 3; "25-49 times" was coded 4; and "50 or more times" was coded 5.

discharge category included unsuitable discharges stemming from alcohol and drug problems, "discreditable incidents," and other discipline problems, as well as dismissal from military training programs. The unsuitable discharge category did not include discharge from the service for medical reasons, dependency or hardship, and pregnancy. The reliability of this dichotomous criterion is unknown. In this sample of military accessions, 16% were discharged for unsuitability. For those discharged, the mean number of days in the service was 451, while the median number of days was 346. Sixty-eight percent of those who received an unsuitable discharge received it between 48 and 939 days of service.

The study employed a predictive research design. The drug information collected from subjects using the EBIS survey was not used in making decisions regarding service entry. Thus, there was no direct range restriction on the predictor. In addition, there was no criterion contamination. Those who made decisions about unsuitability discharge did not have access to this drug-use data.

Results

Table 1 presents the sample size, mean, standard deviation, percentage of missing data, and test-retest reliability for each item. The test-retest reliabilities were estimated from a subsample ($N = 754$) of individuals who completed the EBIS survey twice. The average test-retest time lapse was 38 days. The reliability for the frequency of heroin use item was

TABLE 2
*Percentage of Respondents in Each Response Category Who Are
 Classified as Unsuitable (Sample Size in Parentheses)*

	Age at First Drug Use					No response	
	<=14	15-17	>=18	Never			
Marijuana	21.0 (150/715)	18.2 (395/2176)	16.6 (109/655)	14.6 (859/5865)		19.6 (152/777)	
Hard drugs	30.4 (7/23)	26.0 (38/146)	18.7 (23/123)	15.9 (1452/9157)		19.6 (145/739)	
	Drug-related arrest/ conviction				No response		
	No arrest	Arrest— no conviction	Arrest— conviction				
Drug offense	15.8 (1472/9329)	32.2 (29/90)	27.0 (10/37)		21.0 (154/732)		
	Frequency of drug use (times used)						No response
	Never	1-4	5-9	10-24	25-49	>=50	
Marijuana	14.2 (800/5652)	16.4 (297/1808)	18.8 (119/634)	21.1 (117/555)	15.9 (40/251)	23.7 (108/455)	22.1 (184/833)
Cocaine	15.5 (1358/8788)	20.2 (63/312)	28.6 (14/49)	23.4 (11/47)	33.3 (4/12)	18.8 (3/16)	22.0 (212/964)
Stimulants	15.0 (1213/8107)	18.9 (133/704)	21.5 (41/191)	23.1 (36/156)	29.2 (19/65)	31.7 (20/63)	22.5 (203/902)
Depressants	15.2 (1331/8784)	22.2 (70/316)	30.0 (24/80)	31.4 (16/51)	28.6 (6/21)	46.7 (7/15)	22.9 (211/921)
Other narcotics	15.5 (1402/9067)	24.3 (37/152)	31.6 (6/19)	21.4 (3/14)	50.0 (2/4)	60.0 (3/5)	22.9 (212/927)
Other drugs	15.5 (1391/9000)	23.0 (41/178)	25.0 (11/44)	26.9 (7/26)	20.0 (1/5)	33.3 (3/9)	22.8 (211/926)

-.01; this item was dropped from further analysis. The reliabilities of the remaining drug variables range from .16 to .73. While the reliabilities of some of the items are low, such levels of reliability are not uncommon for single-item measures. The percentage of missing responses ranges from 7.2% to 9.6%.

Table 2 presents the percentage of persons in each response category in nine drug variables who were classified on the criterion as unsuitable. While there are some departures from linearity, in general the younger one begins to use drugs and the more one uses drugs, the greater is the probability of being unsuitable for employment. Those who refused to respond to the drug items had unsuitability rates similar to those who reported drug use. Note that although the unsuitability rates for those who used drugs at an early age, those who were arrested or convicted for drugs, or those who frequently used drugs were always higher than the rates for

TABLE 3
*Validity of Pre-Employment Drug-Use Measures for Predicting
 On-the-Job Suitability*

Variable	<i>n</i>	<i>r</i>	% Used at least once
Age at first use of marijuana	9,411	-.05 (-.05)	38
Age at first hard drug use	9,449	-.04 (-.04)	3
Drug arrest/conviction	9,456	.05 (.06)	1
Frequency of drug use:			
Marijuana	9,355	.07 (.07)	31
Cocaine	9,224	.04 (.04)	5
Stimulants	9,286	.07 (.07)	13
Depressants	9,267	.07 (.08)	5
Other narcotics	9,261	.05 (.06)	2
Other drugs	9,262	.04 (.04)	3
Drug-Use Composite Number 1	10,188	.08 (.09)	49
Drug-Use Composite Number 2	8,461	.08 (.08)	40
AFQT percentile	10,188	-.06 (-.06)	NA

Note: For the drug arrest/conviction item, the listed statistic is the percentage of persons who were either arrested or convicted for a drug-related offense. The coefficients in parentheses have been corrected for range restriction (range enhancement in the case of the age at first marijuana use). The Drug-Use Composite Number 1 treated nonresponders as drug users. The Drug-Use Composite Number 2 treated nonresponders as missing data. To obtain a score on Drug-Use Composite Number 2, nonmissing responses were needed on all nine drug items.

those who reported no drug use, the number of persons who reported using drugs, particularly drugs other than marijuana, was small.

Two drug-use composite measures were calculated. Drug-Use Composite Number 1 was calculated by summing the drug questions with the two age questions being reversed scored. That is, those who first tried using a drug early in life would tend to score higher on the drug-composite scale than those who first used drugs later in life or who had never used drugs. Given that the nonresponders resembled the drug users in their unsuitability rates, nonresponders were scored as drug users in calculating the drug composite variable. For the two age-at-first-use questions, the nonresponders were scored as beginning drug use at age 14 or younger. For the arrest-and-conviction item, the nonresponders were scored as being convicted for drug use, and for the six drug-frequency items, the nonresponders were scored as using the drug 50 or more times. In brief, the higher the Drug-Use Composite Number 1 score, the higher one's involvement with drugs through early use, drug-related law contacts, or greater frequency of drug use. Those who refused to respond to the drug questions also scored high on the Drug-Use Composite Number 1. Drug-Use Composite Number 2 was calculated in the same manner as the first composite except that nonresponders were counted as missing data. To obtain a score on Drug-Use Composite Number 2, the applicant needed to provide usable responses to each of the nine drug-use items.

TABLE 4
*Moderator Analyses of the Validity of Pre-Employment Drug Use
 Composite Number 1 for Predicting On-the-Job Suitability*

	<i>N</i>	<i>r</i>	Mean drug use	<i>SD</i> drug use	% Unsuitable
Total sample	10,188	.08	50.0	10.0	16
Testing condition:					
Operational	5,515	.07	50.0	9.9	17
Research	4,673	.09	50.0	10.1	16
AFQT category					
(high ability) I	610	.02	49.0	8.1	9
II	3,045	.09	49.0	8.2	14
IIIA	2,067	.06	49.4	9.2	18
IIIB	3,324	.07	50.6	10.8	17
(low ability) IV	986	.10	52.5	12.9	18
Below IV	156	.12	54.4	14.5	12
Sex					
Male	8,927	.08	50.2	10.2	17
Female	1,261	.07	48.4	7.8	14
Race					
White	7,432	.08	49.7	9.4	17
Black	1,989	.08	50.9	11.6	15
Hispanic	423	.09	49.7	10.4	14
Asian	96	.06	53.1	13.5	8

Note: Drug-Use Composite Number 1 is expressed as a *t* score. High score indicates frequent drug use.

Table 3 displays the observed correlations between the drug-use items, the two drug-use composites, a measure of general cognitive ability (AFQT), and the suitability criterion. Also listed is the percentage of persons, by item, who had used the drug at least once. For the drug arrest or conviction item, the listed statistic is the percentage of persons who had been either arrested or convicted for a drug-related offense. Although the drug-use measures were not used in selection, the variance on all but one of the drug measures was slightly greater in the applicant pool than in the subset of the applicant pool who entered the service. The variable age at first marijuana use had a slightly higher variance in the study sample than in the applicant pool. Table 3 lists the observed validity coefficients and, in parentheses, the coefficients corrected for range restriction.

The validity of the Drug-Use Composite Number 1 was analyzed to determine if it covaried with any of four moderators. The results of these analyses are presented in Table 4. The first potential moderator was testing condition. About half of the subjects were told that their responses were for research purposes only and would not be used in screening decisions. The remaining applicants were permitted to infer that their responses could be used in screening. The validity of the drug composite was not strongly moderated by testing condition. There were no differences in the mean reported drug-use levels between the groups.

The second potential moderator was cognitive ability. One might argue that the more intelligent applicants would be less likely to report illegal drug use, and the resulting inaccuracy would lower the validity for the more intelligent applicants. Although the validity varied across cognitive ability groups, no clear monotonic moderating effect was evident. The mean reported drug-use levels did vary monotonically with cognitive ability, with the most intelligent applicants reporting the least drug use.

The third and fourth potential moderators were sex and race. While there was no compelling argument to expect either variable to moderate the validity of drug-use measures, the potential moderators were examined in deference to federal testing guidelines (i.e., "Uniform Guidelines," Equal Employment Opportunity Commission et al., 1978). Sex was not a strong moderator of the validity of the drug composite, although females reported lower levels of drug use than did males. Race also was not a strong moderator of the validity.

Discussion

Table 2 indicates that employment suitability rates vary with drug-use patterns. Those who have not used drugs before hire are less likely to be judged unsuitable on the job. In general, the earlier one begins to use a drug, the greater is the probability of being classified as unsuitable. Those who have never been arrested for drug offenses have substantially lower unsuitability rates than those who have been arrested. For those who have been arrested for a drug offense, there is no meaningful difference in unsuitability rates for those who are convicted and those who are not convicted. In general, for all drugs, the more times one uses the drug, the greater the probability of being classified as unsuitable.

Although those who report substantial drug use are much more likely to be discharged from the service for unsuitability than those who do not report drug use, the base rate for drugs, except marijuana, is low. These low base rates contribute to the low predictive validity of the drug measures. For applicant pools where the base rate of nonmarijuana drugs is higher than in the present sample, one can expect the validity of the drug measures to increase. For applicant populations where the base rate of self-reported drug use for nonmarijuana drugs is low, however, such drug measures will have little usefulness in employee screening. In this sample, marijuana has a moderately high base rate (31% to 38%), yet its validity is low (.07). Used alone as a predictor of suitability, self-reported marijuana use has positive utility but may be less useful than other predictors of unsuitable employee behavior.

A contributing factor to the low validities of the drug-use measures is their low reliability. Although the magnitude of the reliabilities is not

uncommon for single-item measures, when compared with other personnel selection tools, these reliabilities are very low. In future research, it may be possible to raise the reliability of self-report measures of drug use by assessing the usage with multiple items. For example, the items may request information on the use of a drug in different settings (e.g., work, school) or over different time periods (e.g., during high school, during the last six months).

Those persons with high cognitive skills as measured by the AFQT are less likely to receive an unsuitability discharge. However, the relationship is small ($-.06$). Since the correlation between general cognitive ability and job performance is about $.50$ (Hunter & Hunter, 1984), the low correlation between AFQT and the suitability criterion may indicate that the criterion measures a performance domain that is substantially different from those assessed by supervisor ratings or work samples. Thus, the small correlations between the self-reported drug-use measures and unsuitability may also be a function of the dissimilarity between unsuitability discharge and more common forms of employee performance measurement.

Although the validities were low, it is useful to consider the possible reasons for the extent of the validity. At least two hypotheses can explain the relationship between pre-employment drug use and on-the-job suitability. These hypotheses are similar to two perspectives on the relationship between drug use and delinquency ("drugs cause crime," and "common cause" models) as reviewed by Watters, Reinerman, and Fagan (1985). First, pre-employment drug use may cause lasting physiological and behavioral changes. Some of these physiological and behavioral changes may cause on-the-job performance decrements that increase the probability of being classified as unsuitable. The second hypothesis posits that the relationship between drug use and on-the-job suitability is spurious and that a number of social and psychological factors (e.g., family and school factors, psychological adjustment) cause both drug use and employment unsuitability.

Although none of the validities were substantial, some drugs had stronger relationships with on-the-job suitability than did other drugs. Although the base rates and reliabilities of the measures affect the magnitude of the validities, the differences in relationship magnitude may also be explained by either of the two hypotheses relating drug use and unsuitability. First, some drugs, more than others, are likely to cause severe physiological and behavioral changes that more adversely affect employment suitability. Second, those applicants whose employment suitability has been adversely affected by social and psychological factors may be more likely to use one drug over another. For example, those with severe life-adjustment problems may be more likely to use nonmarijuana drugs, while those with

fewer life-adjustment problems may be more likely to limit drug use to marijuana.

The limited operational validity of pre-employment drug-use measures found in the present research suggests that employers who now rely solely on drug-use measures as predictors of on-the-job suitability will be doing less than an optimal job of applicant screening. Any predictor with a low operational validity will screen in many applicants who prove unsuitable after hire while screening out many applicants who would perform well once hired. For a suitability screening program based solely on pre-employment drug use, the screening errors will be predominantly of two types. First, since use of nonmarijuana drugs is relatively low, many screening errors will result from hiring applicants who do not report drug use yet who prove unsuitable once hired. Second, given that the base rate of marijuana is relatively high, yet the relationship between marijuana use and suitability is low, additional screening errors will result from rejecting applicants who have used marijuana but who, if hired, would be judged suitable.

To minimize selection errors, employers who at present rely solely on drug-use measures for screening applicants for suitability should consider supplementing or replacing their drug-screening programs with selection systems that more optimally predict employee unsuitability. For predicting unsuitability discharge from the military, the predictive power of the high-school graduation dichotomy is higher than the drug-use measures found in the present research. Typically, the discharge rate for non-high-school graduates is approximately twice that of those with high-school diplomas (Cheatham, 1978; Elster & Flyer, 1981; Flyer, 1959; Flyer & Elster, 1983; Means & Laurence, 1984; Sinaiko, 1977). Also research on several paper-and-pencil employee reliability measures (Betts & Cassel, 1957; Gough, 1971, 1972; Haymaker, 1986; Hogan, 1986; Loudermilk, 1966; Paajanen, 1986; Personnel Decisions, Inc., 1986) show useful levels of validities. Such measures may provide better prediction of employee unsuitability than drug-use measures because they tap a wider range of background and personal characteristics predictive of unsuitability.

Limitations of the Present Study

While this study makes a contribution to cumulative knowledge on the effects of pre-employment drug use on subsequent employment suitability, the limitations of the study should be made explicit and the effect of the study's limitations on the results should be estimated. Five caveats are offered.

First, the questions are self-report measures of illegal acts. One can expect some systematic distortion of the respondents' answers. For example, it appears that the missing data are not random. In this study, those who

provided missing or nonusable responses were consistently more likely to be classified as unsuitable. For those who provide nonmissing responses, it is reasonable to expect more of the responses to be underestimates rather than overestimates of pre-employment drug use. The effect of this pattern of distorted responses is to limit the variance of the questions and, thus, to underestimate the true relationship between pre-employment drug use and subsequent employment suitability. Note that a correction of correlation coefficients for unreliability in the drug measures would not correct for this underestimation if the respondents were consistent in their response distortion.

Second, the unsuitability criterion is of unknown reliability and is potentially subject to systematic error. While data on this issue are nonexistent, it is thought that military discharge categories are sometimes selected on the basis of administrative ease rather than the accuracy of their descriptions. Thus, it may be possible that an unsuitable recruit may be discharged with a fully honorable discharge if it hastens the recruit's separation from the service. This unestimated error may cause the validities to be underestimates of the true relation between pre-employment drug use and on-the-job suitability.

Third, the base rate of the criterion (16%) is very low. Criteria with low base rates are difficult to predict with almost any measure. For example, although measures of cognitive ability typically show substantial validity for predicting many performance criteria, the cognitive ability measure (AFQT) available in this study had a very low validity.

Fourth, military occupations have important differences from civilian occupations. For example, in the civilian sector, failure to follow the instructions of one's supervisor may result in some adverse action (e.g., reprimand, firing). In the military, the same action may result in a court martial and a prison sentence. Conversely, in civilian firms strongly motivated by profit making, marginally suitable employees may be fired. In the military, a person with a similar level of suitability may be reassigned to a position of less responsibility. In contrast to the civilian sector, where one may quit one's job, military personnel who wish to leave service may have difficulty quitting. A military recruit who would not normally engage in irresponsible behavior may engage in such behaviors with the intent of facilitating a discharge from the service.

Fifth, this study's sample is drawn from a population that differs systematically from other populations of interest. The population of military recruits is young, predominantly male, and seldom has education beyond high school. These sample characteristics may limit the generalizability of the findings.

These data and study design limitations precluded the examination of a critical issue that warrants future research attention: the effect of recency

of drug use on employment suitability. One might expect that drug use occurring 10 years ago will have less effect on employee suitability than drug use occurring last week. Given the increasing use and debate over drug testing for employment screening and the lack of research on the topic, personnel psychologists should devote more attention to this area.

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