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DRUGS IN THE WORKPLACE

RESEARCH and EVALUATION DATA

Public Health Service • Alcohol, Drug Abuse, and Mental Health Administration

DRUGS IN THE WORKPLACE: Research and Evaluation Data

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DRUGS IN THE WORKPLACE:
Research and Evaluation Data

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Introduction and Summary

Research on the Prevalence, Impact, and Treatment of Drug Abuse in the Workplace

Steven W. Gust, Ph.D. and J. Michael Walsh, Ph.D
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The late 1980's have seen unprecedented growth in awareness and concern over drug use and its toll on the health and productivity of Americans. In the last several years this increase in interest has been fueled in part by societal perceptions. Dramatic incidents of drug-related violence and death-witness the deaths of sports celebrities Len Bias and Don Rogers, the sudden and widespread emergence of "crack" cocaine, and the record-breaking murder rate in the Nation's Capital—shape public opinion in powerful ways. There have also been striking examples of drug-related workplace disasters. In 1987, in Chase MD a Conrail engineer admitted smoking marijuana just before his train was involved in a collision with an Amtrak train which resulted in 16 deaths and scores of injuries. These dramatic drug-related events serve to highlight a more general societal concern about drugs. Indeed several public opinion polls over the last several years have found that drugs are perceived as the number one problem facing the U.S. Workplace-related drug use and its consequences are obviously important components of this problem, and the workplace has immense potential as the focal point of significant activities to decrease drug use and its adverse consequences (Walsh and Gust,1989).

There has been an important public and private sector reponse to these concerns reflected in a two-pronged strategy to reduce the supply of and the demand for drugs. Demand reduction strategies hold the most promise for long term reduction of use and include programs to reduce workplace-related drug use. Employee assistance programs (EAPs) have begun to expand their focus to include identification and referral of drug-impaired employees and offer great potential for reducing workplace-related drug use. The number of EAPs has grown dramatically until today approximately 30 percent of employed Americans have access to an EAP (Bureau of Labor Statistics, 1989). A second and more controversial strategy for reducing demand for drugs is drug testing. The application of urinalysis techniques to detect recent drug use has been adopted by a majority of the largest employers in the U.S. and today approximately 20 percent of all employed Americans work in a business with a drug testing policy (Bureau of Labor Statistics, 1989).

Given that a large majority of the adult population of the U.S. is employed, worksite programs have unique potential for success in reducing drug use and its adverse consequences in a large proportion of the drug using population. The social and fiscal contingencies tied to employment provide the basis for potentially powerful techniques to modify behavior. Mechanisms are in place for observing performance, for setting standards for performance, and for establishing sanctions to enforce those standards.

Missing, however, is the systematic research database on the extent of workplace-related drug use, its impact on performance and productivity, and on the efficacy ofvarious workplace-based strategies to reduce drug use and its consequences. Such a database is required for the sound design, implementation, and revision of effective workplace drug abuse policies. NIDA, in its leadership role within the Federal government in support of research on the causes, consequences, prevention, and treatment of drug abuse, is interested in supporting research to examine these issues. The Office of Workplace Initiatives, within NIDA, seeks to focus these efforts by fostering research and evaluation studies on issues related to drugs and the workplace. Systematic research and evaluation should provide a scientific base ofinformation which will provide government and private sector policymakers with a sound basis for future development of workplace drug programs.

This applied research program represents a new direction for NIDA Research in non-clinical, non-laboratory environments has not been a focus at NIDA primarily due to the costliness and difficulty in designing and performing scientifically acceptable research in “real world” settings. However, the application of sound scientific principles to these problems must be encouraged and supported. This effort promises to provide a valuable source of valid information upon which policy decisions can be made. Indeed, the responsibility to address these problems rests squarely on the shoulders of the behavioral science community.

In an effort to bring together researchers working in the area and to begin a dialogue between the research community and the business community, the Office of Workplace Initiatives sponsored a conference in September of 1988. The research represented here in this resulting monograph is very much state-of-the-field in this somewhat nascent area and, as such, may not in all cases meet the most rigorous standards for research methodology. However, as a body of research it accurately describes the current state of research and evaluation activities going on in work environments in the drug abuse area and should serve to alert and motivate the concerned researcher about the need and opportunity for addressing some of these important issues. The studies contained herein can be divided into three primary topic areas: prevalence of drug use by the workforce, drug use and job performance, and workplace-based efforts to prevent drug use and treat drug abusers.

Prevalence of Drug Use by the Workforce

National estimates of drug use in workplace populations have been difficult to find but represent one of the most frequent data requests from the Office of Workplace Initiatives. Several papers in this monograph, utilizing survey data from national samples, demonstrate that drug use is not simply a problem among unemployed people or students, but that significant drug use is occurring among employed people. The papers by Cook and Voss report results from 1985 surveys, providing replication of findings in two independent samples. Both studies report significantly more illicit drug use in younger employed persons (18 - 34 years), with highest rates for marijuana. Approximately one in nine employed people report current use ofmarijuana, with nearly double that rate (one in five) for younger people aged 18 - 34 yrs. In addition there are significant differences in drug use in different occupational categories, with relatively lower rates in professional and managerial personnel compared to skilled and semi-skilled labor categories.

In addition to national estimates of employment-related drug use based on self-report data, some regional and industry-specific estimates based on chemical testing are included. While the various forms of drug testing provide little information on chronic patterns of drug use (except perhaps for marijuana) they do provide valid and objective indicators of recent drug use. Lund et al., in a previously published report, describe an Insurance Institute for Highway Safety-sponsored study of 317 randomly selected tractor-trailer drivers who provided blood and urine specimens for drug analysis. Overall, 20 percent tested positive for drugs. Of these, 15 percent were positive for marijuana, 12 percent for over-the-counter stimulants, 5 percent for prescription stimulants, 2 percent for cocaine, and less than 1 percent for alcohol. This study represents a particularly fine example of the application of rigorous scientific methodology in afield experiment and demonstrates that valid estimates of recent drug use in workplace environments are attainable.

The paper by Osbom and Sokolov characterizes drug use patterns in a nuclear power plant facility in Southern California. Data was obtained from urinalysis tests of employees and is presented for a several year period. The authors discuss the evolution of the company policy in light of evidence of drug use provided by the urinalysis program, and also describe a novel strategy for “random” sampling of employees. For companies contemplating random drug testing programs this strategy increases the likelihood that employees will be selected at least once but a small likelihood they will be selected more than three times. Such a strategy may offer advantages over simple random sampling.

The paper by Taggart describes trends in drug test positives in a company representative ofanother regulated industry-railroads. Within the context of a discussion of the safety driven policy at Southern Pacific, Taggart outlines the testing policy and describes dramatic decreases in positive drug tests over a five year period. Perhaps most intriguing is the negative correlation between number of drug tests and injury rate—suggesting the need for additional studies of the deterrence effects of drug testing programs and of the relationship between drug use and occupational injuries.

Anglin and Westland report on the California Commercial Laboratory Drug Testing Project, which monitors drug use trends throughout that State using data provided by commercial laboratories involved in drug testing. The authors report that levels of drug use among employed populations were consistently lower than in criminal justice and drug treatment populations. The employment testing data showed that 4 to 7 percent of employees tested positive for marijuana, 1 to 2 percent for cocaine, and 1 to 3 percent for amphetamines. Results were relatively constant over the 12 months of the study.

Data from self-report studies and from various types of workplace drug testing programs is beginning to fill a need for information on the extent and nature of workplace-related drug use and provides data which are critical prerequisites to further study of the effects of drugs on performance and productivity.

Relationship of Drug Use to Performance and Productivity

Laboratory research has demonstrated that basic psychomotor and cognitive skills relevant to job performance are impaired by most drugs (Nicholson and Ward, 1984). However, research on simulated job performance, as well as field studies of the relationships between drug use and other indicators of performance, such as absenteeism, accidents and injuries, job turnover, health care costs, supervisory ratings, and other measures of productivity are lacking. The impact of drug use on these measures of performance and productivity in the workplace has been difficult to assess, partially because of the difficulty in defining the extent of drug use by the workforce, but perhaps more importantly because of the difficulty in designing and carrying out controlled studies in workplace environments. Estimates of prevalence, as described above, can be inferred from self-report data collected in surveys or from various types of drug testing programs. However, most surveys have not collected data which addresses the"impact" of druguse in the workplace, One study projected cost estimates of unrealized productivity due to drug use, but it was based upon assumptions which need additional validation and which address a narrow range of performance indicators (Harwood, Napolitano, Kristiansen, and Collins, 1984). As an initial attempt to explore these relationships, several studies described here examine the correlations between indicators of job performance and measures of drug use in both retrospective as well as prospective manners.

While a positive urine test for a drug cannot be used to prove impaired performance, nor can it be used to infer intoxication or being under the influence, it does prove recent use of that drug. As such, it can he used as an objective marker of recent use and has considerable research utility. Several of the studies described below utilize drug test results as indicators of drug use.

Normand and Salyards describe a multi-phased study of the U.S. Postal Service intended to assess drug use prevalence in their job applicant population and to evaluate the relationshipbetween drug testing results and job performance indicators. A total of 5,465 job applicants at 21 sites were urine tested for the presence of illicit drugs at the time of job application. Test results were not disseminated to hiring officials and had no bearing on these applicants' success or failure in obtaining a position with the Postal Service. Overall, 8.4 percent of those hired tested positive, approximately two-thirds for marijuana, one-quarter for cocaine and 10 percent for other drugs. Analysis of the data showed a significant association between test results and each of the targeted employment measures, absenteeism and job turnover. Employees who tested positive were found to be absent at a rate 43 percent greater than those who tested negative. Subjects who tested positive for cocaine were more than three times as likely to be heavy leave users as their drug free counterparts. Involuntary job separation measured 40 percent higher among the drug positive group members. Cocaine-positive applicants displayed involuntary separation rates nearly twice that of those who tested negative. Accidents, injuries, and employee benefit claims are additional measures earmarked for analysis in this ongoing study. This study is the first of its kind, a large-scale prospective evaluation of the utility of job applicant drug testing, and promises to provide valuable objective data on a controversial subject.

Blank and Fenton describe a study of U.S. Navy recruits which shares a key design feature with the U.S. Postal Service study-the identification of drug users through urinalysis and subsequent prospective performance evaluation. The report compares a group of approximately 500 male recruits who had tested positive for marijuana (THC) at the time of induction with a matched group who tested negative for any illicit drugs. Demographic differences in education level, Armed Forces Qualification Test (AFQT) scores and race between the THC positive and negative groups reached significance. While age, marital status and place of origin, on the other hand, revealed no appreciable differences between groups. Examination of retention patterns showed that a greater percentage of the THC negative group (81 percent) than the THC positive group (57 percent) were still in the Navy after 2½ years. A total of 14 percent of those from the THC positive group left the Navy for drug or alcohol related problems and another 21 percent were discharged early for other behavioral or performance problems. In contrast, only 1 percent of the THC negative group were removed for drug/alcohol related difficulties and only an additional 8 percent for behavioral or performance problems.

In a considerably larger military sample, McDaniel examined the utility of self-report of pre-employment drug use in predicting on-the-job suitability. Subjects studied were those 10,188 individuals who entered military service within one year of taking the self-report survey. 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. In the sample studied, 16 percent were discharged for unsuitability. Results indicated that in general, the earlier one began to use drugs and the more one used drugs, the greater was the probability of being unsuitable for employment. However, operational validity of pre-employment drug use measures was limited, and supplementation of the drug screening program with other unsuitability predictors was recommended.

Crouch and co-authors describe a model of a cost-benefit analysis of the Utah Power and Light Co. (UP&L) drug program which provides additional data on the correlation between drug use and job performance. Drug using employees were found to be absent more often than controls, with drug-positive employees taking sick leave at a rate 35 percent greater than control employees and unexcused absences at a rate 240 percent greater than control employees. While medical cost data analysis was inconclusive, drug positive employees were 5 times more likely to have a reportable vehicle accident than controls. The authors provide a detailed cost-benefit analysis in which the program was found to provide a potential yearly cost savings to the company of $660,000 if the differences in these measures between drug users and non-users could be eliminated. In addition this paper provides a thoughtful analysis of the potential costs of a comprehensive drug program. The authors enumerate contributing factors such as planning meetings, legal fees, analytical testing, quality assurance expenses, implementation of employee assistance programs (EAPs) and grievance procedures. For the UP&L Co. these expenses were reported to total $482,327.

Sheridan and Winkler outline an ongoing, NIDA-sponsored, evaluation of drug use at the Georgia Power Company. Data was derived for a five year period on employees who 1) drug-tested positive, 2) drug-tested negative, 3) entered an EAP for drug/alcohol-related problems, 4) obtained medical benefits for alcohol or drug treatment, 5) entered an EAP for other problems, or 6) were discharged for problems other than drug and alcohol use. In this report, those testing positive were compared to those testing negative and to the workforce as a whole on several measures of job performance and productivity. As in the Postal Service study, employees who tested positive for drugs had higher rates of absenteeism. Differences were found both in measures of absenteeism due to sickness as well as due to various non-paid types of leave (docked time, disciplinary suspensions, etc.). Employees testing positive averaged 48 hours of sick leave per year, while the workforce as a whole averaged only 23 hours per year. Even more dramatic differences existed in measures of non-paid leave, with those testing positive averaging 75 hours of non-paid leave per year compared to 15 hours for the entire workforce. Future analyses will compare drug using groups and other groups of employees mentioned above with matched controls over a one year observation period on measures of absenteeism, accidents, and medical claims.

Statistics concerning excessive absenteeism, accidents and injuries, health care utilization, and other counter-productive behaviors of employed drug abusers have been reported in the popular press, cited by political leaders, and even mentioned in NIDA publications. These statistics have been based on little empirical research, however. The studies described here are beginning to provide such data on the relationship between drug use and behaviors which have impact in the workplace. Caution must be used in interpreting these results. While drug use measures may be correlated with performance indicators, that tells us little about mechanisms which determine these relationships. For example, it may be that drug use causes more absenteeism because of the direct behavior-impairing effects of acute or chronic use of a particular drug, or drug users may possess certain behavioral or personality traits which make them more likely to be absent from work. From the pragmatic perspective of a policy maker it may not make much difference. The utility of drug use information is that if individuals who use drugs cost the company money it is worthwhile reducing the number o fusers in the workforce (by preventing them from entering the workforce or treating those already in it). From a scientific perspective, however, it is important to search for mechanisms which underlie differences in behavior between drug users and nonusers. This is especially true because drug use measures may come to be used as "markers" for other characteristics which may be viewed as being related to adverse or unproductive behavior in the workplace. The papers in this monograph show that demonstrable differences exist between users and nonusers in some measures of work performance. The challenge remains to determine the causative factors underlying these differences.

Industry Responses to Drugs in the Workplace

The business community has responded to real and perceived problems related to drug use by implementingvarious policies meant to deter drug use (and related activities such as drug sales) as well as identify and refer drug abusing employees to appropriate treatment. The most prevalent components of workplace drug policies are: 1) having formal written policies on drugs, 2) having employee assistance programs, and 3) havingdrugtestingprograms. A recent survey suggests that nationwide about 43 percent of employed people work in an establishment with a formal policy on drug use, 31 percent work where there is an employee assistance program, and 20 percent work in an establishment which has a drug testing program (Bureau of Labor Statistics, 1989). These policy components, when enhanced with provisions for supervisory training and employee education, comprise what the Federal government terms a comprehensive drug-free workplace program. This monograph offers chapters which describe survey research efforts to begin to characterize and explore the programs behind these statistics.

Axel offers an interesting comparison of companies that have drug testing policies and those that do not. She finds that the prevalence of testing varies by industry and that companies with drug testing programs view drug problems as being worse than those that do not. These companies are also more likely to employ strategies other than drug testing to deal with workplace-related drug use. Backer offers a slightly different perspective and presents data from a sample of employee assistance programs. His objectives are to describe typologies of drug abuse services offered through these programs and to identify emerging issues which may impact future delivery of these services.

Blum describes data from four studies that are part of an ongoing research program on workplace management of health issues, including employee assistance and drug testing programs. The findings provide a picture of an organizational reponse to drug use from four different perspectives-human resource managers, supervisors, employee assistance coordinators, and a cross section of employees. Roman continues and expands upon the role of employee assistance programs by presenting data from a followup survey of EAPs in six states. He describes how the drug abuse caseload has changed in the last few years and discusses how EAPs have responded and should respond to changing societal and organizational environments.

Emerging Issues

As research data on issues related to drugs and the workplace begin to emerge there is and will continue to be a need to constantly reassess and redirect research resources toward new research questions. Several papers in this monograph provide such assessment and recommendations for future research efforts.

Googins begins with a review of the role of the supervisor in workplace substance abuse program efforts, emphasizing the integral role which supervisory involvement has historically played in the process of identification and referral of troubled employees. He goes on to discuss how that role has become more complex and will continue to evolve as workplace policies themselves evolve. The early identification and referral of drug abusing employees is key to successful rehabilitation and return to work. Googins argues that such a process depends on effective supervisory involvement.

Angarola and Rodriguez remind us that drug abuse policy is not established outside the legal and political environment. Consideration of the legal environment has obvious relevance to research planning and this chapter is offered as a summary of existing legislation which may impact on research study designs. While there has been recent Federal legislation establishing the parameters of drug programs for Federal employees, Federal contractors, and regulated industries, the States have also begun to adopt laws which define and restrict certain aspects of workplace drug programs—primarily drug testing. At the time the chapter was written eight states had adopted comprehensive drug testing laws. The authors discuss this legislation in terms of twelve basic provisions, compare and contrast the various State's legislation, and discuss model elements and basic principles which other States should consider when developing such legislation.

In the final chapter Gerstein and Grossman offer a framework for conceptualizing data needs and data sources which can serve as a blueprint for future research on drug and workplace issues. They identify three distinct though interrelated concerns about workplace-related drug use—workplace safety, productivity, and health. They also identity three sources of data about workplace related drug use—chemical testing, self report, and observation. They make the point that a systematic research effort is needed to explore the acceptability, costs, and utility of each of the three detection methods in addressing the various concerns. Unfortunately there is not much data yet to begin to fill the cells in such a matrix and the authors conclude with some suggestions on how the business and research communities might begin to work more closely to provide this important data.

Conclusion

NIDA's mission is to support basic and applied research, disseminate research findings, and provide scientific leadership in an effort to reduce drug abuse and its consequences. Research on issues related to drugs and the workplace is a new endeavor but is a natural outgrowth of NIDA's program of research on related topics (e.g., prevention, treatment, drug testing methods, drug effects on performance). A systematic research database upon which todesign, implement, and revise effective drug abuse policy is needed. Although there has been growth in the numbers of workplace programs, there has not been parallel growth in program evaluation activities.

These papers demonstrate that such activities are beginning and that data from surveys and drug testing programs has tremendous potential utility for the researcher and evaluator. Such data will be used to develop new or modify existing programs to address drug use by the workforce and its consequences in the workplace.

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Prevalence of Drug Use by the Workforce

Drug Use Among Working Adults: Prevalence Rates and Estimation Methods

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INTRODUCTION

There is little doubt that illicit drugs are used by working adults in this country. Although employed people may have lower drug use rates than the unemployed, (Kandel, 1980) employment does not eradicate the urge to use drugs. Also, drug use among high school students, as reflected in the National Survey of High School Students (Johnston, O'Malley & Bachman, 1987), is probably not dramatically different from the young adult working population. It is unlikely that most youths cease their drug use upon entering the workplace. These assumptions are supported by empirical evidence gathered primarily from two sources: (1) self-report surveys, and (2) the results from an increasing number of drug testing programs in industry. Furthermore, an examination of the caseload characteristics of Employee Assistance Programs (EAPs) reveals significant percentages of employees seeking help for drug use and abuse problems (e.g., Blum and Roman, 1986).

Most of what is known about drug use in the workplace comes from studies that are severely limited by their sampling (confined to a region, industry or age group) and the variables measured (often merely the results of a drug test). Consequently, very little is known about patterns, dynamics and circumstances of drug use in the workplace. Moreover, the self-report surveys and chemical testing carry their own set of strengths and weaknesses as methods for estimating drug use prevalence.

This article is intended to: (1) present national prevalence data on drug use among working adults, and (2) examine the central methods for estimating the extent of drug use in the workplace.

The first section presents the results of a secondary analysis of a 1985 national household survey. The analysis was conducted on a sub-sample of working adults, focusing on their use of marijuana and cocaine. The second section contains a review of the principal methods for estimating drug use prevalence, including a discussion of their strengths and weaknesses.

SURVEY OF WORKING ADULTS

In 1985, the Gallup Organization questioned 3,006 adults age 18 and older about their use of marijuana and cocaine on confidential, self-administered answer sheets. The survey was conducted on behalf of the Social Research Group of George Washington University in conjunction with a grant from the National Institute on Drug Abuse. The survey consisted of face-to-face interviews with members of households throughout the United States. Of those interviewed, 1,716 adults were employed in jobs outside the home; the balance were students, housewives, or retirees. This analysis examines the drug use of the sample of employed adults and attempts to identify the groups of employed adults most in need of drug prevention, education, and treatment programs.

Two measures of drug use, current use and past-year use, are used in the analysis. Interviewees were asked, "When was the most recent time you took (the drug)?" Current users are defined as those who said they used marijuana or cocaine within the past 30 days. Recent users are adults who reported use in the past year and current users.

To describe patterns of drug use among employed adults and identify specific groups of employees with higher rates of drug use prevalence estimates of marijuana and cocaine use were calculated by: 1) occupational category and 2) selected sociodemographic characteristics of the employees. The sociodemographic variables examined included age, sex, and education. Data analyses were done in two steps. First, Chi-Square cross-tabular analyses calculated drug rates, then a multivariate analysis, employing the Automatic Interaction Detector (AID) approach, was used to identify subgroups of the sample with maximally differing rates of drug use prevalence.

RESULTS

Drug Use by Job Category

Overall, 18 percent of the total sample reported past-year marijuana use, and 6 percent reported past-year cocaine use. The sample reported current marijuana and cocaine use of 11 percent and 2 percent, respectively.

Current marijuana and cocaine use rates by occupational category are shown in Table 1. Significant differences were found among occupational categories in current marijuana use; no differences were found in current cocaine use. Current marijuana use rates ranged from 7 percent for professional/managerial and clerical personnel to 16 percent for the skilled trades. Current cocaine use ranged from 1 percent to 5 percent among laborers. Past-year use rates of the two substances were considerably higher, ranging from 13 percent to 22 percent for marijuana and 2 percent to 11 percent for cocaine, but the differences were not statistically significant.

Table 1. Current Marijuana and Cocaine Use Among Employed Adults by Type of Employment

Job Category	Marijuana Use Current (%)	Cocaine Use Current (%)
Professional/Managerial (n = 546)	7	1
Business/Farm Owner (n = 77)	13	2
Sales/Manufacturers Representative (n = 99)	15	3
Clerical (n = 212)	7	1
Skilled Trade (n = 251)	16	3
Semi-skilled Trade (n = 19)	12	1
Laborer (n = 36)	10	5
Service Worker (n = 170)	12	4
Other (n = 68)	24	2
	chi sq = 19.5 $p < .05$	chi sq = 6.6 NS

Drug Use by Sociodemographic Variables

Analysis of marijuana and cocaine use by age group, sex, and education reveal some clear indications of the employees most likely to have used one of these drugs during the past year.

1. Age

Age is the most significant predictor of marijuana and cocaine use (Tables 2 and 3). Younger employees, 18 to 34 years old, were more likely to report drug use than older employees. One-fifth (20 percent) of the 18- to 34-year-old employees reported current marijuana use, compared to 6 percent of those 35 to 44 years old and less than 2 percent of those 45 and older. Similarly, these younger employees were more likely than older workers to report past-year marijuana use. The rate of past-year marijuana use among the 18- to 34-year-old employees was nearly 30 percent, compared to 3 percent or lower among employees 45 and older. Cocaine use was considerably less prevalent than marijuana use, even in the high-risk age group. In this survey, current cocaine use among 18- to 34-year-old employees was 4 percent. However, the past-year cocaine prevalence rate for this group was 12 percent compared to 2 percent among older employees, indicating that a significant number of these younger employees had at least experimented with cocaine.

2. Sex

Marijuana and cocaine use was significantly higher among male than among female employees. Fourteen percent of the adult men reported current month marijuana use, compared to 8 percent of the women (Table 2). Similarly, 8 percent of the men reported current cocaine use, compared to 4 percent of the women.

3. Education

There were no significant differences in marijuana or cocaine use rates across the four educational categories (Tables 2 and 3).

Table 2. Current Marijuana and Cocaine Use Among Employed Adults by Sociodemographic Characteristics

	Marijuana Use Current (%)	Cocaine Use Current (%)
Age Group		
18-24 (n = 194)	19	4
25-34 (n = 482)	20	4
35-44 (n = 412)	6	1
45-54 (n = 276)	2	1
55 + (n = 283)	1	*
	Chi sq = 66.7 p < .001	chi sq = 14.1 p < .01
Sex		
Male (n = 950)	14	3
Female (n = 699)	8	1
	chi sq = 8.8 p < .01	chi sq = 5.5 p < .05
Education		
Less than High School Graduate (n = 217)	16	3
High School Graduate (n = 535)	11	1
Some College or Technical School (n = 437)	11	3
College Graduate (n = 455)	9	2
	Chi sq = 4.8 NS	Chi sq = 1.6 NS

Table 3. Past-Year Marijuana and Cocaine Use Among Employed Adults by Sociodemographic Characteristics

	Marijuana Use Past-Year (%)	Cocaine Use Past-Year (%)
Age Group		
18-24 (n = 194)	29	12
25-34 (n = 482)	30	12
35-44 (n = 412)	11	2
45-54 (n = 276)	3	2
55 + (n = 283)	2	*
	chi sq = 100.3 p < .001	chi sq = 44.9 p < .001
Sex		
Male (n = 950)	21	8
Female (n = 699)	13	4
	chi sq = 11.5 p < .001	Chi sq = 6.0 p < .05
Education		
Less than High School Graduate (n = 217)	22	9
High School Graduate (n = 535)	17	4
Some College or Technical School (n = 437)	18	8
College Graduate (n = 455)	14	7
	chi sq = 4.3 NS	chi sq = 4.7 NS

Marijuana And Cocaine Use Among Younger Employees 18 To 34 Years Old

An analysis of the characteristics of the high-risk group (18 to 34-year-olds) reveals significant differences in drug use among sub-groups. Tables 4 and 5 show past-month and past-year drug use rates ofyounger workers by sex and education.

Male employees are more likely to report current and recent marijuana and cocaine use than female employees. For example, current marijuana use among men was 24 percent compared to 14 percent for women. Employees with less than a high school education have higher rates of marijuana and cocaine use than employees with higher levels of education. Current marijuana use ranges from 35 percent for employees who had not finished high school to 16 percent for employees who have attended or graduated from college.

No significant differences were found in the drug use rates of this high-risk group across occupational category.

Multivariate Analysis Results

Amultivariate AID analysis was used to partition the sample of employees 18 to 34 years old into subgroups with maximal differences in prevalence rates on each of the drug use indicators. Based on the prevalence of use, the results identified subgroups at highest and lowest risk for drug use problems.

Current marijuana use, which averaged 19 percent of this age group, was 26 percent for the group working as skilled or semi-skilled trade workers, sales personnel, and business owners. A lower rate was found among the group consisting of professional, managerial and clerical, laborers and service workers. Analysis of current cocaine use for employees 18 to 34 years old did not indicate the presence of sample subgroups with significantly different rates. This is attributed in part to the relatively low average prevalence (4 percent) of this kind of drug use.

Past-year marijuana use, which averaged 29 percent for the age group as a whole, was especially prevalent among certain sub-groups of 18- to 34-year-old employees. Past-year marijuana use among employees who did not complete high school was estimated to be 63 percent for clerical, sales and service workers, compared to 35 percent for those working in other occupations. Among employees with higher levels of education, men were more likely to have used marijuana in the past year (33 percent) than women (19 percent).

DISCUSSION

Data from this national survey of working adults have important implications for industry's response to the drug problem. The results demonstrate that:

- There is considerable illicit drug use among working adults.
- The most significant indicator of drug use is age.
- In addition to age, drug use rates differ greatly according to sex, education, job category.

In general, marijuana and cocaine use were much more prevalent among employees under 35 than among older employees and more prevalent

Table 4. Current Marijuana and Cocaine Use Among Employed Adults 18 to 34 Years Old by Sex and Education

	Marijuana Use Current (%)	Cocaine Use Current (%)
Sex		
Male (n = 390)	24	5
Female (n = 286)	14	2
	chi sq = 7.7, $p < .01$	Chi sq = 4.2, $p < .05$
Education		
Less than High School Graduate (n = 72)	35	7
High School Graduate (n = 214)	19	3
Some College or Technical School (n = 208)	16	4
College Graduate (n = 182)	16	4
	Chi sq = 11.5, $p < .01$	Chi sq = 2.0, NS

among men than women. Current marijuana use was more likely to be reported by employees who did not complete high school than by employees with higher levels of education. Current marijuana use was also more prevalent among skilled trade workers, sales personnel, business owners and service workers than among other occupational groups. Current cocaine use was less prevalent than current marijuana use and there was not a significant indicator of use based on demographic and occupational groups. Therefore, the findings suggest that industry-based programs focus their efforts especially on marijuana use of younger employees.

The results also generated important findings about the patterns of marijuana and cocaine use among working adults. Apparently, marijuana use is more prevalent than cocaine use among employees and is more likely to be a regular, continuing pattern of use than cocaine use.

Table 5. Past-Year Marijuana and Cocaine Use Among Employed Adults 18 to 34 Years Old by Sex and Education

	Marijuana Use Past-Year (%)	Cocaine Use Past-Year (%)
Sex		
Male (n = 390)	36	15
Female (n = 286)	23	8
	chi sq = 8.6 p < .01	chi sq = 4.5 p < .05
Education		
Less than High School Graduate (n = 72)	49	22
High School Graduate (n = 214)	31	8
Some College or Technical School (n = 208)	25	11
College Graduate (n = 182)	25	14
	Chi sq = 12.5 p < .01	Chi sq = 8.5 p < .05

Marijuana use tended to become ongoing for those who tried it. In contrast, cocaine use prevalence was much lower, and its use tended to be experimental and/or occasional rather than ongoing.

These estimates are quite close to those generated by the 1985 NIDA Household Survey, which found that 29 percent of workers in the 20-to 40-year-old range reported use of some illicit drug in the past year, and 19 percent reported some illicit drug use in the past month (NIDA, 1988).

Newcomb (1988) conducted one of the most illuminating work force drug use studies. His research, intended as a longitudinal study of the etiology of adolescent drug use, surveyed a sample of 1,634 young adults (739 subjects responded) 9 years after the initial data collection, when the average age of the respondent sample was 21.9. The subjects were asked a wide variety of questions regarding drug use, including use on the job. Marijuana and cocaine were the most frequently used drugs. During the previous 6 months, 42.8 percent reported using marijuana and 33.8 percent reported using cocaine. Sixty-four percent of the sample was employed, 50 percent of whom worked full-time (prevalence rates are not reported for the working sub-sample). These prevalence rates are substantially higher than those found in both this study's sample and in the 1985 NIDA sample of 20- to 40-year-olds. The two most likely explanations for the higher rates in Newcomb's sample are: 1) the entire sample was drawn from Los Angeles County where drug use is higher than the national rate (Newcomb, 1988); and 2) the young age of the sample.

The Newcomb study is especially noteworthy for its examination of drug use on the job (e.g., 20.1 percent of full-time workers reported using marijuana on the job) and for its identification of correlates of "disruptive" drug use (high while at work). In some important ways this study stands as an example of the kind of research that the field needs. However, problematic sampling severely limits its utility as an national indicator of drug use prevalence.

A REVIEW OF METHODS FOR ESTIMATING DRUG USE IN THE WORKFORCE

Chief methods for estimating drug use prevalence in the workplace are selfreports and chemical testing. These two methods are vastly different from one another. Self-reports can produce drug use data sets rich with information on frequencies, patterns, consequences, etc., but almost always raise questions about their validity. Chemical testing, on the other hand, supplies only a single datum for a given drug (i.e., whether the individual has recently used the drug, irrespective of current intoxication). Despite concerns about the accuracy ofchemical testing (Hansen, Caudill and Boone, 1985), the basic validity of the chemical testing methods is rarely disputed.

Chemical testing is seldom employed for the purpose of producing prevalence estimates. Typically it has been used, in both industry and the military, as a means of identification and deterrence. However, it is often the only indicator of drug use prevalence available for a particular working population.

Self-report techniques are much more widely used for prevalence estimation purposes as exemplified by both the National Survey of High School Students and the National Household Survey. Self-report methods remain virtually the only means for determining frequency and patterns of drug use.

Self Reports of Drug Use

Validity of the data is typically the chief problem associated with self-reports of drug use. Validity issues are further exacerbated when self-report data are gathered in the workplace. Thus, self-reports used to estimate drug use in the workforce raise serious concerns about their validity, particularly if such information is used to formulate policy.

In 1985, NIDA published a monograph examining the validity of self-report methods for estimating drug use (Rouse, Kozel, and Richards, 1985). Although there is no specific discussion of workplace issues, the reader is referred to the monograph for its detailed examination of the central issues surrounding self-reports. The general consensus to emerge from the monograph was that valid drug use data can be gathered through the self-report method, but there are a broad set of factors and conditions that can invalidate the data if one is not, as Harrell(1985) put it, "constantly vigilant."

Self-report validity is a complex, multi-faceted phenomenon, potentially affected by a myriad of factors and forces. Moreover, it should be understood that the validity of any self- report is a precarious condition governed by a non-compensatory dynamic: *All* threats to validity must be recognized and guarded against or the integrity of the data will be suspect.

Researchers might picture the validity of any individual's response to a self-report item as a condition suspended at the end of a chain. The links in the chains represent all the factors that need to be present to obtain a veridical response from the subject. The length of the chain (the number of links, or necessary factors) for any given item will vary according to the nature of the research (respondent characteristics, mode of self- report, etc.) and the tension on the chain will increase with the sensitivity of tbe topic. If any of the links are weak, the chain could break and the response will be invalid. If most of the chains (items) contain weak links, the validity of the data will be jeopardized, particularly if the topic is a sensitive one. This "chain-link" model captures the essential dynamics of self-report validity. It recognizes that:

- Validity is constantly affected by many factors, that vary in number and type depending on the nature of the inquiry.

- The validity of a given response is absolute, veridical or not, to a given item, although the validity of the entire self-report data set is relative.

- The more sensitive the topic, the more precarious the validity of the data.

The chain-link model is also consistent with the recommendations of Nurco that "researchers in the field steep themselves in the nuances of veridicality until they appreciate the magnitude of the problem and are prepared to devise anticipatory strategies to avoid its many pitfalls" (Nurco, 1985).

A double-blind study of the validity of NIDA's Household Survey was conducted and procedures were found to be generally valid (Harrell & Kapsak, 1986). Assuming (following the chain-link model) all other safeguards have been observed, people tend to tell the truth about drug use in the privacy of their homes. In contrast, the author compared the results of drug use self-reports collected *in the workplace* with the results of unannounced chemical testing. Many workers were found to be less than forthright about their drug use, despite assurances of confidentiality (Cook, 1987). Apparently, assurances of confidentiality were not strong enough for many of the drug using workers. These results were not interpreted as evidence that workers will respond dishonestly to questions about their drug use but were indicative of extreme strain on thevalidity chain (i.e., data collection in the workplace relied on workers who were mistrusting of management and fearful of job loss).

Chemical Testing

Drug testing, usually in the form of one of the urinalysis techniques, is being increasingly used by industry as a means for:

- Culling out drug users from among job applicants
- Deterring use by employees
- Or identifying drug-impaired workers (testing for probable cause) (Axel, 1986).

Drug testing was never intended as a prevalence estimation technique. However, the relative paucity of self-report data in the workplace, coupled with the large number of companies that are currently conducting drug testing, have led to the use of chemical test results as an indicator of drug use prevalence in the workplace.

As currently practiced in most industries, drug testing results typically provide more shadow than substance. The problem is not one of veridicality of measurement, but one of sampling. Most of the testing is conducted not on employees but on job applicants. Random testing is on the rise, particularly in the public utilities, the transportation industry, and the Federal Government. Even with "random testing" the samples are often small and not always truly random (i.e., entirely unannounced). Consequently, with the exception of the results from the armed forces, drug testing currently tells us very little about even the single datum asked of it— i.e., the proportion of the work force that has recently ingested a given drug. Moreover, even in the situations where drug testing provides that important binary datum on the population in question, it tells us no more than that. Little can be learned from drug testing about patterns, frequencies, circumstances, etc. about employee drug use.

CONCLUSIONS

National data on the prevalence of drug use in the work force are available from only a few sources, (e.g., the survey data presented herein and sub-group analyses of the NIDA Household Survey data (Voss, this volume)). Although these data sets are 3 years old and the current picture has no doubt changed, the striking similarity between the two sets is reassuring.

Drug testing results provide interesting information on drug use in the work force by region (Anglin, this volume) and in the military. The military data are perhaps a bit easier to interpret than the laboratory data from California, because populations tested, sampling, and particular testing procedures are known and specified. Yet, the military is a very atypical organization and current drug use data from the armed forces suggests little about the civilian work force.

These and related data sets (e.g., the Newcomb work) represent an initial understanding of the prevalence of drug use in the work force. Clearly, however, much needs to be done if we are to have accurate, recent drug use data.

At the level of the individual company or industry, prevalence estimates can probably best be obtained by a combination of survey-interviews and drug testing (Cook, in press). A representative sample of employees would be interviewed (preferably off the work site) about their drug use, and at the same time, urine samples would be collected and analyzed. All data would be gathered anonymously, and individual results would, of course, be confidential. This assessment procedure would capitalize on the complementary strengths of the two procedures: the comprehensiveness of the self report and the validity of drug testing.

To obtain national drug use prevalence data on the workforce, together with information on drug use dynamics, it is probably best to sidestep the corporate structure and reach the working population in their homes. Valid data can be obtained in household interviews (assuming, ofcourse, that procedures designed to maximize validity are used). NIDA (or a consortium of business interests) may consider conducting a national household survey of *employed adults* on an annual or biannual basis. Such a survey would be very different from the current NIDA Household Survey. It would contain less detail on drug use (e.g., fewer drugs assessed) and would address central issues of workforce drug use dynamics. A much less costly alternative to a face-to-face household survey of workers would be to conduct the survey by telephone. Studies suggest that valid drug use data can be obtained by telephone (Frank, 1985), although procedural validation for collecting workforce data would be advisable before implementing the telephone survey on a routine basis.

The last few years have seen the development of a considerable amount of information about drug use among the workforce. However, the available data are still only outlines and fragments of the problem. Much remains to be done.

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Patterns of Drug Use: Data From the 1985 National Household Survey

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INTRODUCTION

The 1985 National Household Survey on Drug Abuse was the eighth in a series of studies whose primary purpose was to measure the prevalence and correlates of drug use in the United States. The data were gathered by the Institute for Survey Research at Temple University and analyzed at the University of Kentucky.

Illicit drug use increased substantially in the United States in the 1970s. According to the household surveys, for persons under 25 years of age, the highest levels of use for most drugs were observed in 1979. The 1982 results suggested either a leveling off or the beginning of a decline in the use rates for most drugs for youth and young adults. The 1985 household survey was conducted to determine any continuation or change in these trends.

METHODOLOGY

For the 1985 survey, the household population of the continental United States, age 12 and over, was sampled using a multistage area probability design. Blacks, Hispanics, and younger persons were oversampled to increase the reliability of the estimates of drug use in these important groups. Housing units were selected in small clusters averaging 16 occupied, nonbusiness households. Screenings were attempted in a total of 25,968 households. The goal was to interview approximately 4,000 whites, 2,000 blacks, and 2,000 Hispanics. Selections of sampling locations, households, and eligible respondents within households were specified in the sampling plan. Interviewers were not permitted to make substitutions.

Pretests of the interview were conducted in early 1985 in Philadelphia and New York to refine the instrument and the interview. Of the 566 persons trained as interviewers, 50 percent were minority group members, 30 percent were bilingual, and 75 percent were females. Slightly less than 9 percent (n=700) of the interviews were conducted in Spanish. The interviews were completed between mid-June and mid-December 1985. Of the 8,038 interviews, 3,949 were with whites, 1,945 were with blacks, 1,996 were with Hispanics, and 148 were with persons from other racial or ethnic groups.

Table 1. Percentage and Estimated Number of Users of Selected Drugs in the U.S. Household Population, Age 12 and Older

	Percentage	Estimated Number of Users
Marijuana		
Lifetime	32.4	61,940,000
Past Month	9.4	18,190,000
Cocaine		
Lifetime	11.6	22,240,000
Past Month	2.9	5,750,000
Inhalants		
Lifetime	6.8	12,940,000
Past Month	0.9	1,940,000
Hallucinogens		
Lifetime	6.7	12,880,000
Past Month	0.8	1,460,000
PCP		
Lifetime	2.8	5,310,000
Past Month	*	700,000
Heroin		
Lifetime	1.0	1,930,000
Past Month	*	160,000
Cigarettes		
Lifetime	75.7	144,510,000
Past Month	31.5	60,280,000
Alcoholic Beverages		
Lifetime	86.1	164,360,000
Past Month	59.1	113,070,000

* Less than one-half of one percent.

Source: NIDA, National Household Survey on Drug Abuse, 1985.

FINDINGS

The figures in Table 1 are estimates of overall drug use in the Nation's household population in 1985. Eighteen million people then used marijuana. The nearly 6 million current cocaine users were, with few exceptions, a subset of the 18 million marijuana users. The numbers are smaller for the other illicit drugs. Nearly one-third of the population smoked cigarettes, and over half (59.1 percent) consumed alcohol.

Marijuana

As Table 2 indicates, almost one-third (32.4 percent) of our citizens over age 12 used marijuana at least once. The lifetime rates for marijuana use

Table 2. Use of Marijuana, Current Employment, and Age Group (Percentages)[1]

A. Use in Lifetime

Current Employment	Age Group 12-17	18-25	26-34	35 +	Total
Full-time	51.8	62.5	62.8	25.4	43.0
Part-time	24.5	48.7	55.3	16.4	32.0
Unemployed	49.0	70.3	58.8	16.3	47.4
Other	18.7	57.7	43.6	4.3	15.2
Total	23.6	60.3	58.5	15.9	32.4

B. Use in the Past Month

Current Employment	Age Group 12-17	18-25	26-34	35 +	Total
Full-time	34.4	23.5	17.7	3.7	11.7
Part-time	11.0	15.2	19.5	2.4	10.2
Unemployed	25.6	33.2	27.3	4.8	21.5
Other	9.3	14.3	8.4	*	4.0
Total	12.0	21.8	16.9	2.3	9.4

[1] Other includes students and homemakers and persons who are retired or disabled.
* Less than one-half of one percent.
Source: NIDA, National Household Survey on Drug Abuse, 1986.

were approximately 60 percent among 18 to 25 year-olds and 26 to 34 year-olds. Even 23.6 percent of the 12 to 17 year-olds used marijuana; by contrast, the lifetime rate of marijuana use among persons aged 35 years and older was 15.9 percent. With the exception of older adults, whites had the highest rate in each age group.

For the current employment category, it is best to ignore the youth since percentages for full-time employees and unemployed persons were based on a small effective sample size (60 and 40, respectively). Three-fourths of the youth in the sample were classified as "other," a category including students (Table 2). Current use of marijuana, or use in the month preceding the interview, was minimal among persons aged 35 years and older (2.3 percent), but was higher among youth (12 to 17 year-olds—12.0 percent). More 18 to 25 year-olds (21.8 percent) than 26 to 34 year-olds (16.9 percent) used marijuana during the previous month ($p < .001$)

Table 3. Occupational Level and Current Use of Marijuana by Adults (Percentages)

	Age			
Occupational Level	18-25	26-34	35 +	Total
Professional	22.0	16.5	4.8	9.7
Technical & Sales	15.7	15.7	3.1	9.4
Service	18.1	22.8	4.2	12.2
Farming	10.6	3.5	0.7	4.5
Production & Craft	34.9	21.8	2.7	15.8
Operators & Fabricators	28.2	21.2	2.0	13.8
Homemaker	12.9	7.4	0.5	3.5
Student	11.7	9.4	—	9.9
Unemployed	33.2	27.3	4.8	21.1
Disabled	64.9	18.2	*	4.1
Retired	—	—	*	*

*Less than one-half of one percent.
Source: NIDA, National Household Survey on Drug Abuse, 1985.

Among youth, more full-time employees were currently using marijuana than were unemployed individuals; but in the older age categories, the highest rate occurred among the unemployed.

Farmers and homemakers had the lowest rates for current use. In contrast, among 18 to 25 and 26 to 34 year-olds, sizable numbers of production and craft workers were current users. Among older adults, the highest rates involved a tie between professionals and the unemployed (Table 3).

Overall, more males than females tried marijuana ($p < .001$), and there was a similar difference for use in the past month ($p < .001$). The differences by sex were substantially greater in the two older age groups than among the 12 to 17 and 18 to 25-year olds. In the two younger age groups, the rate was not significantly higher for males than females for lifetime marijuana use. However, among 18 to 25 year-olds, the difference by sex for use during the previous month (26.5 percent and 17.1 percent) was significant at the .001 level, as was the difference among the 26 to 34 year-olds. Among persons aged 35 and older, males (21.8 percent) were twice as likely as females (10.9 percent) to have used marijuana in their lifetime ($p < .001$).

Except in the oldest age group, lifetime rates were significantly lower for blacks than for whites. Except in the oldest age category, however, the rate was significantly higher for whites than for Hispanics.

Many people who tried marijuana used it extensively (Table 4). Approximately one-fifth of the 18 to 25 (18.8 percent) and the 26 to 34 year-olds (19.6 percent) indicated they had used marijuana 100 or more times. Of the 12 to 17 year-olds who had ever used marijuana, 17.5 percent used it 100 times or more. Almost one-third of the 18 to 25 and 26 to 34 year-olds who ever used marijuana had used it 100 or more times.

Daily marijuana use was defined as use of the drug on 20 or more days during the previous month. Relatively few individuals in the United States household population were daily marijuana users. Among the 12 to 17 year-olds, 2.1 percent reported marijuana use on 20 or more days in the past month. The highest percentage was found among 18 to 25 year-olds; 4.7 percent of them used marijuana on 20 or more of the previous 30 days. Nevertheless, a substantial proportion of the current users smoked marijuana on a daily basis. In each age group, approximately 20 to 23 percent of the current users had used marijuana on 20 or more days during the previous month.

Cocaine

Of all U.S. residents over age 12, 11.6 percent had tried cocaine, and 2.9 percent had used cocaine in the month preceding the interview (Table 5). For lifetime use, the highest rate was found among the unemployed, except among older adults. However, the rates are not much lower among persons employed full-time. The rates for both lifetime cocaine

Table 4. Lifetime Frequency of Use of Marijuana, Current Employment, and Age (Percentages)

Current Employment for Persons 18-34 Years Old

use of Marijuana	Full-time	Part-time	Unemployed	Other
None	37.4	48.7	33.8	50.3
1 - 2	10.8	11.6	10.0	10.7
3-10	15.7	11.1	14.6	13.1
11-99	15.0	13.6	15.1	13.8
100+	21.1	14.9	26.6	12.2

Current Employment for Persons 35 Years Old and Older

Use of Marijuana	Full-time	Part-time	Unemployed	Other
None	74.8	83.6	83.7	95.7
1-2	9.2	5.9	8.5	2.5
3-10	7.7	6.7	6.8	1.1
11-99	3.6	2.8	*	*
100+	4.8	1.0	1.0	*

* Less than one-half of one percent.
Source: NIDA, National Household Survey on Drug Abuse, 1986.

use and use in the past month were higher among 18 to 25 and the 26 to 34 year-olds than among youth or older adults. Approximately one-fourth of the 18 to 25 and 26 to 34 year-olds have tried cocaine, but the lifetime rates were 4 to 5 percent among youth and older adults. Approximately 6 to 7 percent of the persons in the two middle age groups had used cocaine during the previous month.

With the exception of the unemployed, the highest rates for current cocaine use were found among production and craft workers and operators and fabricators (Table 6). Only among older adults did professional, technical and sales workers have the higher rates, and those rates were only 1.0 percent. The table indicates a figure of 56.2 percent for disabled young adults; this figure, however, was based on a small number of cases.

Table 5. Use of Cocaine, Age Group, and Current Employment (Percentages)

A. Use in Lifetime

Current Employment	Age Group 12-17	18-25	26-34	35 +	Total
Full-time	12.3	27.5	26.2	7.1	16.3
Part-time	3.6	17.5	23.6	2.6	9.6
Unemployed	13.4	32.1	26.9	5.0	20.0
Other	4.2	20.0	15.3	1.0	4.5
Total	4.9	25.2	24.1	4.2	11.6

B. Use in Past Year

Current Employment	Age Group 12-17	18-25	26-34	35 +	Total
Pull-time	8.0	7.6	6.8	1.0	4.0
Part-time	0.8	3.9	6.9	*	2.2
Unemployed	0.8	13.6	3.1	0.7	6.0
Other	1.2	7.4	3.8	*	1.2
Total	1.5	7.6	6.1	0.5	2.9

* Less than one-half of one percent.
Source: NIDA, National Household Survey on Drug Abuse, 1985.

Similar to the marijuana pattern, significantly more males than females tried cocaine in each age group. Among the young adults, 28.7 percent of males, compared to 21.6 percent of females, tried cocaine. Similar significant differences by gender were observed in the two older age groups.

Ethnic or racial differences in cocaine use were not as clear as gender differences. Among young adults, lifetime cocaine use was significantly higher among whites (28.31 percent) than among either Hispanics (15.0 percent) or blacks (13.4 percent). In this age group, rates for blacks and Hispanics were quite similar. The pattern was similar among the 26 to 34 year-olds, except that the rate was significantly higher for blacks than for Hispanics.

Use of a drug more than 10 times was defined as fairly extensive, rather than experimental. Four percent of the respondents had used cocaine more than 10 times, while 7.4 percent had used it 10 times or less. Use of cocaine more than 10 times was concentrated among the 18 to 25 year-olds (7.7 percent) and 26 to 34 year- olds (10.3 percent). Approximately 1 percent of the youth and older adults had used cocaine more than 10 times. Thus, projected into population estimates, 7.7 million Americans who had ever used cocaine used it more than 10 times. In each age group, at least 20 percent of the respondents who used cocaine had used it more than 10 times.

Table 6. Occupational Level and Current Use of Cocaine by Adults (Percentages)

Occupational Level	Age Group 18-25	26-34	35 +	Total
Professional	5.1	2.8	1.1	1.9
Technical & Sales	5.5	9.5	1.0	4.3
Service	3.8	8.8	0.5	3.2
Farming	2.2	*	*	0.7
Production & Craft	10.3	7.5	*	4.6
Operators & Fabricators	11.2	8.0	1.0	5.5
Homemaker	8.4	4.3	*	1.9
Student	4.1	1.4	*	3.1
Unemployed	13.6	3.1	0.7	6.5
Disabled	56.2	3.5	*	1.9
Retired	—	—	*	*

* Less than one-half of one percent.
Source: NIDA, National Household Survey on Drug Abuse, 1985.

In the 1985 survey, data were obtained about the ways cocaine was used (sniffing, swallowing, freebasing, or injecting). Freebasing involves processing cocaine to eliminate impurities and to free the more potent cocaine base, which is then smoked. Almost all (94.7 percent) users sniffed or snorted cocaine. The most striking finding is that 45.9 percent of the 12 to 17 year-old cocaine users freebased, compared to approximately 20 percent of the cocaine users in the other age groups. This finding probably reflected use of crack. However, when the survey was conducted, crack was largely unknown or unheard of. Injection of cocaine was somewhat higher among users in the oldest age group.

Alcoholic Beverages

More than one-half (55.5 percent) of 12 to 17 year-olds have tried an alcoholic beverage at some time. The figures for the adults were substantially higher (Table 7). More than 90 percent of the 18 to 25 year-olds (92.6 percent) and 26 to 34 year-olds (93.1 percent)had tried alcohol, as had 88.0 percent of those over 35. In view of the high rates for lifetime prevalence, the salient findings were that the rates were consistently but not substantially higher for males than for females and were higher for whites than for blacks or Hispanics in each age group. The rates for previous month use were somewhat lower, but drinkers were a statistical minority only among 12 to 17 year-olds, among whom 31.0 percent had had a drink during the previous month.

Except for youth, significantly more males than females reported using alcohol during the previous month. Rates for current drinking were considerably higher among whites than among blacks and Hispanics in each of the four age groups. This was especially true among older adults; 59.3 percent of whites, compared to 44.0 percent of blacks and 49.6 percent of Hispanics, are current drinkers.

Almost all adults employed full-time indicated that, at some time in their lifetime, they had consumed alcoholic beverages. For current use, the highest rates were observed among persons employed full-time. Approximately 7 of 10 full-time workers drank during the previous month.

Differences in current drinking by occupational level are minimal (Table 8). The figure of 100 percent for retirees who are 26 to 34 years old is based on a sample of one.

Daily drinking was defined as use of alcohol on at least 20 days during the previous month. The pattern for daily drinking was different from marijuana or cocaine patterns (Table 9). Daily drinking was more extensive in the two older age categories than among youth or young adults. Males were almost three times more likely than females to report drinking on at least 20 days during the previous month. Similarly, whites were almost twice as likely as blacks or Hispanics to report drinking on 20 or more days in the previous month. Full-time employees were more likely to drink daily than part-time employees.

Table 7. Use of Alcoholic Beverages, Current Employment, and Age Group (Percentages)

A. Use in Lifetime

Current Employment	Age Group 12-17	18-25	2634	35 +	Total
Full-time	82.3	95.1	95.0	93.5	94.0
Part-time	64.0	90.6	94.6	86.6	83.3
Unemployed	70.4	91.4	88.6	84.3	86.6
Other	48.2	86.6	86.2	82.0	75.6
Total	55.5	92.6	93.1	88.0	86.1

B. Use in Past Month

Current Employment	Age Group 12-17	18-25	26-34	35 +	Total
Pull-time	63.0	76.3	74.2	69.9	72.2
Part-time	38.7	66.0	71.3	60.6	58.2
Unemployed	53.4	70.8	62.8	54.4	62.0
Other	23.2	59.8	54.7	41.4	40.2
Total	31.0	71.4	70.0	57.3	59.1

Source: NIDA, National Household Survey on Drug Abuse, 1985.

Persons who consumed five or more drinks on the same occasion on five or more days in the previous month were defined as heavy drinkers (Table 10). Overall, 6.5 percent of the sample met this criterion. Because the rates are similar, the two middle age categories are combined. As the Table indicates, 12 percent of the persons between the ages of 18 and 34, who were employed full-time or unemployed, were heavy drinkers. Fewer older adults were heavy drinkers, but the 6 percent rate among older adults who were employed full-time cannot be ignored. Not shown in tabular form is the fact that males (10.6 percent) were more likely ($p < .001$) than females (2.7 percent) to be heavy drinkers.

In Table 11 the respondents were classified according to their current pattern of drug use. Tobacco was ignored. Except for persons classified as other in the 35 and older category, the most common pattern involved alcohol use only. Relatively few people used only marijuana. Alcohol and marijuana use was more prevalent among the unemployed than among working persons.

CONCLUSIONS

The above findings of the 1985 household survey indicate that illicit drug use is strongly related to age. Specifically, illicit drug use is extensive in the baby boom generation. Rates for marijuana, which is the most widely used illicit drug, cocaine, or other illicit drugs, such as hallucinogens or PCP, are consistently higher among persons 18 to 34 years of age than among youth (12 to 17 years of age) or older adults (35 years of age and older).

Regardless of the drug, rates for males are generally higher than for females. This difference is also found for measures of quantity or frequency. However, the gender differences are less pronounced among youth than among adults. Overall, the gender differences are more pronounced among older adults. The declining pattern for youth and

Table 8. Occupational Level and Current Use of Alcoholic Beverages by Adults (Percentages)

Occupational Level	Age 18-25	26-34	35+	Total
Professional	77.7	73.3	80.4	78.2
Technical & Sales	69.7	72.6	68.5	69.8
Service	72.1	76.8	49.6	62.0
Farming	69.3	66.2	54.4	62.0
Production & Craft	80.9	74.7	64.6	71.3
Operators & Fabricators	77.2	75.8	63.0	70.1
Homemaker	55.5	52.7	37.3	42.8
Student	62.6	61.1	70.2	63.2
Unemployed	70.8	62.8	54.4	62.9
Disabled	69.2	61.3	39.4	42.8
Retired	-	100.0	44.0	44.1

Source: NIDA, National Household Survey on Drug Abuse, 1985.

Table 9. Days Alcohol Was Used in Past Month, Current Employment, and Age (Percentages)

Current Employment for Persons 18-34 Years Old

Days	Full-time	Part-time	Unemployed	Other
None	25.4	32.3	32.3	44.2
1-4 days	36.7	39.9	37.1	39.1
5-19 days	27.6	21.2	20.4	13.8
20+ days	10.3	6.6	10.2	3.0

Current Employment for Persons 35 Years Old and Older

Days	Full-time	Part-time	Unemployed	Other
None	31.0	39.5	49.0	59.8
1-4 days	31.8	26.9	33.0	21.4
5-19 days	22.6	21.5	9.1	9.7
20+ days	14.6	12.1	8.9	9.1

Source: NIDA, National Household Survey on Drug Abuse, 1985.

Table 10. Days in Past Month Respondent Consumed Five or More Drinks, Current Employment, and Age (Percentages)

Current Employment for Persons 18-34 Years Old

Days Drank 5 or More Drinks	Full -time	Part-time	Unemployed	Other
None	62.7	74.6	65.2	82.7
1-4	25.4	17.2	22.9	13.0
5+	11.9	8.1	11.9	4.4

Current Employment for Persons 35 Years Old and Older

Days Drank 5 or More Drinks	Full-time	Part-time	Unemployed	Other
None	78.7	88.4	82.6	93.5
1-4	15.3	8.3	13.6	3.5
5+	6.0	3.3	3.8	3.0

Source: NIDA, National Household Survey on Drug Abuse, 1985 young adults has generally continued. On the other hand, among persons aged 26 and older, most drugs have shown increasing trends. The only exceptions are cigarettes and alcoholic beverages; the highest rates for these substances were recorded in 1979, and the rates for these licit substances have declined slightly. Rates for use of illicit drugs are not uniformly high for persons aged 26 and older: illicit drug use is concentrated among those 26 to 39 years-old, while the rates for persons aged 40 and older are relatively low.

The trend for cocaine is not clear. Among the youth and young adults, the rate for cocaine peaked in 1982, while in the two older age groups, 1985 was the peak year. The rate for cocaine may be even higher when the next household survey is conducted. However, for other illicit drugs,

Table 11. Current Pattern of Drug Use and Current Employment for Adults[1] (Percentages)

Current Employment for Persons 18-34 Years Old

Drug Pattern	Full-time	Part-time	Unemployed	Other
No Drug Use	23.7	30.9	28.9	41.2
Alcohol Only	52.9	49.6	37.5	42.6
Marijuana Only	0.9	1.0	2.0	0.5
Alcohol & Marijuana	11.1		16.0	5.7
Other	3.6	2:6	3.6	5.2
Alcohol, Marijuana, and Other	7.8	8.0	12.0	4.8

Current Employment for Persons 35 Years Old and Older

Drug Pattern	Full-time	Part-time	Unemployed	Other
No Drug Use	29.1	38.2	43.1	58.6
Alcohol Only	65.0	59.0	51.0	40.2
Marijuana Only	0.7	1.2	1.7	*
Alcohol & Marijuana	1.8	1.3	2.4	*
Other	2.2	*	1.2	1.0
Alcohol, Marijuana, and Other	1.1	*	0.7	*

*Less than one-half of one percent.
[1]Other refers to any use of an illicit drug other than marijuana, or use of an illicit drug and use of either alcohol or marijuana.
Source: NIDA, National Household Survey on Drug Abuse, 1986.

the 1985 study shows a continuation of the trend that began in 1982—rates for illicit drug use have declined slightly or leveled off. Levels, however, are still high.

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Drug Use by Tractor-Trailer Drivers*

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INTRODUCTION

In 1985, about 4,500 people died in crashes involving tractor-trailer trucks. Only 17 percent of those deaths were sustained by the truck drivers; the remainder were sustained by other road users, and about 70 percent were occupants of passenger vehicles in collisions with trucks (FARS, 1985).

Truck drivers often spend long hours on the road and have to deal with fatigue, loneliness, boredom, and uncomfortable driving conditions. There is considerable informal information that many truck drivers use drugs as a means of coping with their difficult working conditions. Alcohol, marijuana, cocaine, and amphetamines generally are mentioned as drugs used. In a 1977 mail survey (Wyckoff, 19791, stimulants such as "bennies, goofballs, and copilots" were the most common drugs reported by men truck drivers, with 14 percent saying they used such drugs occasionally or regularly to stay awake while driving. The percentage reporting the use ofmarijuana or narcotics while driving was much smaller, although self-reported marijuana use was higher among younger drivers (about 14 percent of drivers under 25 years of age said they used marijuana occasionally or regularly just before or while driving). Use of alcohol while driving was not queried specifically, but 6 percent of drivers reported that they felt they could drive without problems within 2 or 3 hours of drinking.

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Other than anecdotes and these self-reports, however, there is little scientific evidence about drug use by truck drivers. Even in the case of alcohol, reliable information is limited to postmortem analyses of fatally injured drivers. Data from 23 States that test 80 percent or more of fatally injured drivers for alcohol indicate that about 1 in 8 tractor-trailer drivers killed in single-vehicle crashes has blood alcohol concentrations (BACs) at or above 0.10 g/dL. About 15 percent have positive BACs (FARS, 1985). In the much more common multiple-vehicle fatal crashes involving large trucks, the truck driver is rarely killed, and there is no systematic alcohol testing of such drivers.

The extent to which truck drivers are operating their rigs under the influence of drugs, such as alcohol, marijuana, or cocaine, that may affect their performance is an important question. It is also also important to know if stimulants, such as amphetamines or their less potent "look-alikes" (for example, phenylpropanolamine or ephedrine), are being used by drivers to stay on the road for excessive hours. The present study was designed to gather information on the incidence of drug use by drivers of tractor-trailer trucks based on blood and urine samples. The study also gathered information on the general health status of truck drivers, but the current report is limited to analyses and findings regardingdruguse.

METHODS

Sample Selection

During the week of December 15,1986,359 tractor-trailer truck drivers who stopped at the westbound side of the Brownsville, Tennessee, truck weighing station on Interstate 40 were asked to participate in the study. All trucks weighing more than 10,000 lbs (4,500 kg) are required to pull into the station and come to a complete stop at the scales. The present study was coordinated with a series of random log-book inspections scheduled by the Tennessee Public Service Commission (PSC) for the Brownsville station. The log-book check typically requires only a few minutes and consists of checking required documentation. At the start of each sampling period, the first truck to be given a log-book inspection was selected randomly. Subsequently, each truck selected for inspection was the next truck across the scales following completion of the previous inspection. Because the completion of an inspection is unrelated to the characteristics of the next truck at the scale, the selection procedure provides a random sample of truck drivers. A selected truck was sometimes overweight or had a visible safety defect or both. These trucks were processed appropriately, then given the log-book check.

At the conclusion of the inspection, the driver was invited to participate in an anonymous and voluntary health survey. The driver was told that the survey was conducted by a nonprofit research organization which was not connected with the state of Tennessee, and he could earn up to $30. Drivers of single-unit trucks were not included because these trucks were less likely to be involved in interstate transportation. Tandem or “double-bottom” rigs were excluded because their size would have been unmanageable within the existing parking facilities, given the volume of trucks that were being processed. Women drivers were excluded as were co-drivers not operating the tractor at the time it entered the station. Thus, the invited drivers were men operating randomly selected tractors pulling either no trailer or a single trailer.

Sampling was conducted during one 6-hour sampling period and four 12-hour periods. The 6-hour period ran from noon to 6 p.m. on Monday, 15 Dec. 1986. The four 12-hour periods began at 6 a.m. on Tuesday, 2 p.m. on Wednesday, 6 p.m. on Thursday, and 6 p.m. on Friday. Sampling was completed at 6 a.m. on Saturday, 20 Dec. 1986.

Of the 359 drivers asked to participate in the study, 38 declined. The most frequently cited reason for declining was that they were late or in a hurry (18 drivers). In addition to the 38 refusals, 4 drivers accepted the invitation but either could not or would not provide either blood or urine, for a total of 42 nonparticipating drivers (12 percent). The average age of the 317 drivers providingblood or urine was 37 years with an average of 12.7 years of driving experience. Data about the drivers who refused participation were limited. However, their average age (39 years) and the condition of their trucks as rated subjectively by the PSC officers were similar to those of the participants.

Driver Interviews and Testing

The survey team operated in three motor homes parked in the corner of the weigh station lot as far from the enforcement officers as possible. Two of the motor homes were used for interviewing and testing, and the third was used for processing specimens.

Drivers were initially directed by the officers to one of the two motor homes used for interviews. Each was staffed with a male interviewer and a female registered nurse. The interviewer greeted the driver at the door, asked the driver not to reveal his name or the name of his company, described the study, explained that all information was to be strictly anonymous and requested that the nurse be allowed to take his blood pressure. The blood pressure test was followed by a driver interview. The first half of the driver interview consisted of questions concerning trucks and driving.[1] The second half, administered by the nurse, consisted of health-related questions.

Following the interview, the nurse requested that drivers provide a urine sample. Urine was provided unobserved in the bathroom of the motor home. The nurse then requested a blood sample from the driver. Blood was drawn into one 7-mL tube plus two 13.5-mL tubes. The urine samples and the 7-mL tube of blood (containing appropriate preserva-

Table 1. Drugs Tested by SmithKline's Comprehensive Drug Analysis

Acetaldehyde	Diphenhydramine	Norpropoxyphene
Acetaminophen	Disopyramide	Nortriptyline*
Acetone	Doxepin	Oxycodone*
Amitriptyline	Doxylamine*	Pentazocine*
Amobarbital	Ephedrine*	Perphenazine
Amoxapine*	Ethanol	Pentobarbital
Amphetamines*	Flurazepam	Phenacetin*
Barbital	Glutethimide	Phencyclidine*
Benzoylecgonine*	Hydrocodone*	Phenmetrazine*
Brompheniramine	Hydromorphone*	Phenobarbital
Butabarbital	Ibuprofen	Phensuximide
Butalbital	Imipramine	Phenylpropanolamine*
Cannabinoids*	Isopropanol	Phenytoin
Carbamazepine	Lidocaine	Primidone
Carisoprodol	Loxapine	Procainamide
Chlordiazepoxide	Meperidine	Prochlorperazine*
Chlorpheniramine*	Mephenytoin	Promazine*
Chlorpromazine	Meprobamate	Promethazine*
Chlorpropamide	Mephobarbital	Propoxyphene
Clorazepate	Morphine*	Pyrilamine*
(as Nordiazepam)	Methadone	Quinidine
Cocaine*	Methadone Metabolite	Quinine*
Codeine*	Methamphetamine*	Salicylates
Demoxepam	Methanol	Secobarbital
Desipramine	Methaqualone	Thioridazine
Desmethyldoxepin	Methsuximide	Trifluoperazine
Dextromethorphan*	Methyprylon	Tripelennamine*
Diazepam	Nordiazepam	

*Tested in urine only - not quantitated.

tive and anticoagulant) were immediately refrigerated. The two other tubes of blood were allowed to coagulate, placed in a centrifuge, and the resulting serum was refrigerated. All specimens were assigned case numbers and shipped on the same day obtained, by air from Memphis, Tennessee, to SmithKline Bioscience Laboratories in Waltham, Massachusetts.

Drivers were paid $30 for participating in the study and agreeing to provide urine and blood. Drivers were also offered a coded envelope, which their doctor could use to request the results of their tests.

Drug Testing Procedures

SmithKline screened the urine, blood or serum samples, or some combination of these for the substances shown in Table 1. The screen was performed using SmithKline's standard procedures for drug analyses with two exceptions, First, SmithKline's standard procedure at the time was to test and confirm the presence of cannabinoids in urine by two independent enzyme multiplied immunoassay tests (EMIT). For this study positive findings in urine were additionally confirmed by gas chromatography-mass spectroscopy (CC-MS) or high-performance thin layer chromatography (HPTLC) where there was sufficient urine. The second exception was an additional test of the urine samples using a new TDx fluorescence polarization immunoassay for amphetamine and methamphetamine.

When a substance was detected in either urine or blood, the finding was checked and confirmed, usually by an alternative, chemically independent test procedure; only confirmed findings are presented in the results, with one exception. Nine cases where cannabinoids were found in urine had too little urine for alternative tests. However, four of the nine cases were found to have cannabinoids in the corresponding blood samples, and the other five were positive on two independent EMIT tests. Although these last five are unconfirmed by alternative tests, it is unlikely that they represent false positives, and they are included in the test results.

When drugs were detected, their concentrations were quantitated in blood (or serum) wherever possible (for example, alcohol). For several drugs of interest (marijuana, cocaine, and the sympathomimetic amine class of stimulants such as amphetamine or phenylpropanolamine) SmithKline provided only qualitative tests in urine. When these drugs

Table 2. Drugs Tested by CTI in 25 Randomly Selected Urine Samples

Amphetamines	**Cocaine**
Amphetamine	Cocaine
Ephedrine	Benzoylecgonine(metabolite)
Methamphetamine	**Flurazepam**
Phenylephrine	**Marijuana**
Phenylpropanolamine	Delta-9-tetrahydrocannabinol(THC)
Pseudoephedrine	Carhoxy-THC(metabolite)
Antidepressants	**Opiates**
Amitriptyline	Codeine
Amoxapine	Heroin
Desipramine	Hydrocodone
Doxepin	Hydromorphone
Imipramine	Morphine
Loxapine	Cxycodone
Maprotiline	**Opioids**
Nortriptyline	Meperidine
Trazodone	Metadone
Antihistamines	Pentazocine
Barbiturates	Propoxyphene
Amobarbital	**Phencyclidine**
Butalbital	Phencyclidine (PCP)
Butabarbital	PHP
Pentobarbital	TCP
Phenobarbital	**Phenothiazines**
Secobarbital	

were detected and confirmed in urine, the corresponding blood or serum samples were provided to Chemical Toxicology Institute (CTI) in Foster City, California, for further testing and quantitation.[2] In addition, blood or serum samples from the 18 drivers who had provided no urine were analyzed by CTI for evidence of marijuana, cocaine, and sympathomimetic amines, since the comprehensive drug analysis provided no test for them in the absence of urine.

As a cross-check on laboratory test procedures, CTI reanalyzed all blood samples for alcohol, and a random sample of 25 urine specimens were retested for the drug classes described in Table 2. CTI's results were essentially the same as those of SmithKline except for minor differences in the alcohol findings (see Results) and, in one case, phenylpropanolamine was detected and confirmed by SmithKline but not by CTI.

RESULTS

A total of 317 drivers provided sufficient quantities of either urine or blood for analysis. Urine samples, in sufficient quantity for most of the analyses, were provided by 299 drivers; blood samples were provided by 307 drivers; and 289 provided both substances.

Alcohol

All urine and blood samples were analyzed for the presence of alcohol, using gas chromatography with a nominal detection threshold of 0.01 g/dL in blood or urine. Alcohol was detected in the blood of three drivers and in the urine of a fourth. The alcohol concentrations in the three positiveblood samples were 0.01,0.02 and 0.03 g/dL. The driver with the positive urine sample had no detectable alcohol in blood, and the driver with blood alcohol concentration of 0.01 g/dL had no detectable alcohol in urine. CTI's reanalyses of the blood samples (detection threshold of 0.002 g/dL) found slightly lower concentrations of alcohol in two cases and no alcohol in the third case (BAC = 0.01 g/dL for SmithKline) or any of the other 304 blood samples. The slightly lower concentrations found by CTI (0.004 and 0.020 g/dL) probably reflect some evaporation of alcohol during the repeated sampling from the blood specimens. Only two cases of detected alcohol are considered confirmed (less than 1 percent of the drivers).

Marijuana and Cocaine

Fifty drivers (16 percent of all 317 participating drivers) had evidence of marijuana (15 percent) or cocaine (2 percent) use or both in their urine or blood; four drivers (1 percent) had metabolites of both substances in urine or blood (Table 3). Among the 47 drivers with evidence of marijuana use in either urine or blood, followup analyses found delta-9-tetrahydrocannabinol (THC)—the primary psychoactive constituent of marijuana—in the blood samples of 11 drivers, or 3 percent of the total sample (five drivers who had cannabinoids in their urine did not provide sufficient blood for analysis). At the thresholds used in this study, measurable quantities of THC indicate either recent or relatively frequent use of marijuana (Mason and McBay, 1985); (Willette, 1985); (Hanson et al., 1983). Thus, at least 3 percent of the drivers appear either to be frequent users or to have used marijuana recently. Among the other drivers with evidence of marijuana use, little can be determined about the recency of use because marijuana metabolites can be detected even in blood for up to 2 weeks after intake by frequent users (Peat et al.,

Table 3. Tractor-Trailer Drivers With Evidence of Marijuana or Cocaine Use

Drug	Urine Analysis[1] Number	Urine Analysis[1] Percent	Urine and Blood[2] Analyses Number	Urine and Blood[2] Analyses Percent
Marijuana	43	14	47	15
[THC][3]	not tested		[11]	[3]
Cocaine	6	2	7	2
Marijuana or Cocaine	46	15	50	16
Total Specimens	299	—	317	—

[1] Urine samples for 299 drivers were tested for the presence of cannabinoid metabolites by EMIT with a nominal detection threshold of 50 ng/ml. All positives were reaffirmed by a second independent EMIT. In all cases where there was sufficient urine for additional testing, the presence of cannabinoids was confirmed by chemically independent, alternative tests as well as the second EMIT. In 32 cases, alternative confirmation was obtained by GC-MS (gas chromatography-mass spectroscopy); two cases with less fluid were alternatively confirmed in urine by high performance thin layer chromatography. Nine cases had insufficient urine for alternative testing, but marijuana was found in blood or serum of four of these cases by GC-MS.

The presence of cocaine or its metabolites in urine was determined by thin layer chromatography with a detection threshold of 1 µg/ml and confirmed by EMIT.

[2] Cannabinoids and cocaine metabolites were tested for and quantitated by GC-MS in the blood samples of 38 drivers who were positive in the urine screens (five drivers with positive urine results did not provide sufficient blood for analysis); nominal detection thresholds were 2.5 ng/ml for cannabinoids and 50 ng/ml for cocaine and its major metabolite, benzoylecgonine. Blood samples for an additional 18 drivers who provided insufficient urine were screened for the presence of marijuana or cocaine by radioimmunoassay (RIA, detection threshold of 10 ng/ml for cannabinoid metabolites and 50 ng/ml for cocaine and its metabolites) and positive results were confirmed and quantitated by GC-MS.

[3] THC was tested for in the blood samples of 38 drivers whose urine tested positive for cannabinoids(excluding 5 drivers with no blood for analysis)and four drivers who provided no urine but whose blood samples tested positive for cannabinoids.

Table 4. Test Results for Marijuana

Specimen No.	Urine Results/ Confirming Test*	Blood/Serum Results**			
		Substance	RIA	THC	Carboxy-THC
524	+/GC-MS	blood	+	-	20
526	+/GC-MS	blood	+	3.0	54
527	+/GC-MS	blood	-		
532	+/GC-MS	no blood or serum			
533	+/GC-MS	blood	+	2.8	66
535	+/EMIT	blood	-		
536	+/EMIT	blood	-		
543	+/EMIT	blood	+	-	52
544	+/EMIT	blood	-		
548	+/EMIT	blood	-		
550	+/EMIT	blood	+	12	45
553	+/HPTLC	blood	-		
565	+/EMIT	serum	+	-	15
569	+/GC-MS	serum	+	-	6.8
571	+/GC-MS	serum	+	-	17
574	+/GC-MS	no blood or serum			
584	+/GC-MS	serum	+	-	40
586	No urine	blood	+	<2.5	18
595	+/GC-MS	serum	+	-	16
596	+/GC-MS	serum	+	-	20
599	No urine	blood	+	-	3
610	+/GC-MS	serum	+	-	7.5
611	+/EMIT	no blood or serum			
629	+/GC-MS	serum	+	-	34
640	+/GC-MS	serum	+	-	62
677	+/GC-MS	serum	+	-	87
696	+/GC-MS	serum	+	-	3.9
698	+/GC-MS	serum	+	3.3	63
771	+/GC-MS	serum	+	-	5.6
773	No urine	blood	+	<2.5	9
775	+/GC-MS	serum	+	-	22
780	+/GC-MS	serum	+	-	31
795	+/GC-MS	no blood or serum			
797	+/HPTLC	blood	-		
808	+/GC-MS	blood	+	-	3.7
828	+/GC-MS	serum	+	5.5	67
839	+/GC-MS	blood	+	-	15
841	+/GC-MS	no blood or serum			
876	+tGC-MS	serum	+	11	148
881	+/EMIT	blood	+	-	8.1
889	+/GC-MS	serum	+	-	18
890	+/GC-MS	serum	+	-	55
894	+/GC-MS	serum	+	7.0	148
897	+/GC-MS	serum	-		
899	+/GC-MS	serum	+	-	66
909	No urine	blood	+	2.5	13
916	+/GC-MS	serum	+	4.6	38

Table 4. Test Results for Marijuana (continued)

* All urine tests were positive for cannabinoid metabolites on two independent EMIT tests (nominal detection threshold was 50 ng/ml). Additional confirmatory tests were CC-MS (gas chromatography-mass spectroscopy) or HPTLC (high performance thin layer chromatography); where present, these confirmatory tests are indicated by "+/CC-MS" or "+/HPTLC".

** Blood or serum samples were screened qualitatively by radioimmunoassay (RIA) and positive results were quantitated for THC and Carboxy-THC by GC-MS in ng/ml (nominal detection threshold of 2.5 ng/ml).

Table 5. Evidence of Marijuana and Cocaine Use in Blood Samples Corresponding to Urine Samples With Positive Results

Drug	Number Confirmed Positive in Urine	Number of Corresponding Blood Samples	Number of Positives in Blood
Marijuana	43	38	30
Cocaine	6	5	1
Marijuana or Cocaine	46	41	31

1984). Individual results for all marijuana tests, includingblood concentrations, are in Table 4.

Table 5 shows the results of followup analyses of the blood samples (when available) from drivers whose urine tested positive for marijuana and cocaine. Marijuana metabolites were detected in 30 of the 38 blood samples analyzed. Eight of the drivers whose urine samples had been confirmed for cannabinoids had no detectable concentrations of THC or other cannabinoids (for example, carboxy THC) in their blood. This finding is not unusual, because marijuana metabolites are detectable in urine for a much longer period (even weeks for frequent users) than in blood. These drivers, although they had cannabinoids in their urine, probably had not used marijuana in several days.

Table 6. Tractor-Trailer Drivers With Sympathomimetic Amines (Stimulants)

Drug	Positive Urine Analyses[3] Number	Positive Urine Analyses[3] Percent	Positive Urine and Blood Analyses[4] Number	Positive Urine and Blood Analyses[4] Percent
Amphetamine, Methamphetamine	4	1	7	2
Phenylpropanolamine, Ephedrine, Pseudoephedrine	36	12	38	12
Phentermine[1]	not tested		10	3
Prescription-only Stimulants[2]	4	1	16	5
All Stimulants	39	13	48	15
Total Specimens	299	—	317	—

[1] Phentermine was not screened in the urine samples and may be underrepresented in the final results.

[2] Amphetamine, methamphetamine, and phentermine are central nervous system stimulants found only in prescription medications. No drivers reported medically prescribed use of these substances within the previous 48 hours. Phenylpropanolamine, ephedrine, and pseudoephedrine are central nervous system stimulants found in many over-the-counter as well as prescription diet and cold preparations. About half of the drivers positive for these substances reported taking cold medications that could have accounted for their presence.

[3] Urine samples for 299 drivers were screened initially by thin layer chromatography with a nominal detection threshold of 1 mg/ml and confirmed by EMIT. Subsequently, 257 samples were rescreened by fluorescence polarization immunoassay with a detection threshold of 0.3 µg/ml and confirmed by gas chromatography-mass spectroscopy (GC-MS).

[4] Sympathomimetic amines were tested for and quantitated by GC-MS in the blood samples of 35 drivers with positive urine results (four other drivers positive in urine did not provide sufficient blood for analyses). Nominal detection thresholds for these substances were 50 ng/ml. Blood samples for 18 drivers who provided insufficient urine and another 53 drivers with unconfirmed positive results on the urine TDx assay were screened for sympathomimetic amines by GC-MS. Positive findings were confirmed by gas chromatography-nitrogen phosphorus detection method for substances not detected in urine.

Among five drivers whose urine showed evidence of cocaine use and who had provided blood samples, three were positive for cocaine or its metabolites in blood by radioimmunoassay. However, none had measurable quantities of unmetabolized cocaine in blood as measured by GC-MS; one had benzoylecgonine (less than 50 mg/mL), a major metabolite of cocaine. One additional driver with no urine was positive for cocaine metabolites in blood; he had no detectable cocaine, and the concentration of benzoylecgonine was less than 50 mg/mL. These results probably reflect the rapid metabolism of cocaine. Typically, its use is detectable in urine for only 2 or 3 days and for even shorter periods of time in blood.

Sympathomimetic Amines (Stimulants)

Central nervous system stimulants of the sympathomimetic amine class were detected and confirmed in the urine or blood of 48 (15 percent) of all 317 participating drivers (Table 6). Five percent had detectable concentrations in urine or blood of amphetamine, methamphetamine, or phentermine, drugs that are available only by prescription. Twelve percent had detectable levels of phenylpropanolamine, ephedrine, or pseudoephedrine, other sympathomimetic substances that are available in over-the-counter medications as well as by prescription.

Table 7. Sympathomimetic Amines (Stimulants) Detected in Blood Sample Corresponding to Urine Samples With Positive Results

Drug	Number Confirmed Positive in Urine	Number of Corresponding Blood Samples	Number of Positives in Blood
Amphetamine, Methamphetamine	4	3	3
Phenylpropanolamine, Ephedrine, Pseudoephedrine	36	33	18
Phentermine		Not tested	
Prescription-only Stimulants	4	3	3
All Stimulants	39	35	20

The corresponding blood samples from 35 of the 39 drivers whose urine tested positive for sympathomimetic amines were analyzed when available (Table 7). All of the drivers who provided blood and whose urine was positive for amphetamine or methamphetamine had detectable amounts of these substances in their blood. Eighteen of the thirty-three drivers whose urine was positive for phenylpropanolamine, ephedrine, or pseudoephedrine had one of these substances in their blood. As with marijuana and cocaine, these drugs are typically detectable in urine for longer periods after use than in blood; their absence in blood while present in urine suggests that they had not been taken in at least several hours.

Table 8 shows the extent to which sympathomimetic amines were found in blood, based on testing of three groups: drivers who had positive urine tests for these substances, drivers who provided blood only, and drivers whose blood was analyzed on the basis of unconfirmed positive tests for amphetamine or methamphetamine in urine.[3] Thirty drivers (9 percent of all 317 drivers) had one or more of these stimulants in their blood. Phentermine was found in 10 drivers; its presence among all 317 is probably underestimated because it is not included in SmithKline's urine test and was thus tested for only in the 106 drivers whose blood samples were analyzed for sympathomimetic amines.

Reported Use of Sympathomimetic Drugs

All drivers were asked whether they had used prescription or nonprescription drugs during the previous 48 hours. Only one reported medically prescribed use of drug preparations containing amphetamine, methamphetamine, or phentermine during the previous 48 hours, and he indicated he was using drugs to stay awake. However, of the drivers with only nonprescription sympathomimetic amines (32 drivers), about half (15) indicated they had used over-the-counter drug preparations for the treatment of cold or flu symptoms that might have accounted for the presence of the detected drug; this was judged to be the case if the reported medication contained the detected substance or another sympathomimetic substance that might have been contained in a medication similar to that named by the driver (this procedure allowed for unintentional mislabeling of drugs by the drivers). These drivers accounted for about one-third of the drivers whose urine or blood had contained sympathomimetic amines, leaving about 10 percent of the total sample with detectable levels of sympathomimetic substances (prescription or nonprescription or both) whose use was not explained medically.

Table 8. Tractor-Trailer Drivers with Sympathomimetic Amines (Stimulants) in Blood*

Drug	Number	Percent
Amphetamine, Methamphetamine	6	2
Phenylpropanolamine, Ephedrine, Pseudoephedrine	20	6
Phentermine	10	3
Prescription-only Stimulants	15	5
All Stimulants	30	9
Total Drivers	317	

* Based on blood analyses of those with positive urine tests (N = 35), blood analyses of those drivers who provided only blood (N = 18) and blood analyses of 53 drivers who had unconfirmed positives in urine for amphetamine and methamphetamine (see text) but tested positive in the blood for other stimulants. All blood analyses were by gas chromatography-mass spectroscopy and confirmed by gas chromatography-nitrogen phosphorus detection method except in 13 cases with positive tests for phenylpropanolamine, ephedrine, or pseudoephedrine; confirmation was not obtained in these cases because the blood results were consistent with confirmed urine test results. In all, blood samples from 106 drivers were analyzed.

Other Drugs

The other most commonly detected drugs were salicylates (aspirin) or acetaminophen, which were confirmed in 35 drivers (11 percent). No opioids or hallucinogens were detected, and only one case of a minor tranquilizer (diazepam-nordiazepam) and one case of a barbiturate (phenobarbital) were detected. Both of the latter drivers had reported medically appropriate use of preparations containing these substances, and the driver with diazepam claimed that he had last used the medication more than 48 hours earlier (this claim is not refuted by the positive finding because diazepam and its metabolites are detectable for several days after therapeutic use).

Seventy percent of drivers said they had been drinking coffee and they probably had some caffeine in their urine or blood. However, for this study, the detection threshold for caffeine was set at 20 μg/mL in serum to identify drivers who might be using caffeine pills or consuming very large quantities of coffee to stay awake. Two drivers had such large quantities of caffeine, and one other driver had 13 μg/mL in serum; all three reported drinking large amounts of coffee (more than ten cups since they last slept) or using diet pills.

DISCUSSION

The effect of the detected drugs on the risk of crashes among truck drivers is difficult to estimate, even with information about the concentrations of the drugs in blood. Alcohol, the drug whose effects are best known, was found in less than 1 percent of the drivers, and in every case ofalcohol use, the concentration was well below state per se or presumptive limits and even below the 0.04 g/dL limit for commercial vehicle drivers currently under consideration by the National Academy of Sciences.[4] Nevertheless, alcohol, even in low concentrations, has been shown to produce performance deficits in laboratory tasks (Moskowitz et al., 1985). Given the large distances typically driven by tractor-trailer drivers, the combination of even small amounts of alcohol and fatigue could increase crash risk.

Marijuana and cocaine, one or both of which were detected in 16 percent of the drivers who participated, are controlled substances that are legally available to the public only in very rare circumstances; they should not be present in any amount in truck drivers. The principal psychoactive constituent of marijuana, THC, was detected in the blood of 3 percent of the drivers, suggesting they used marijuana frequently or had used it recently. The effects on driver behavior and crash risk at the concentrations detected are not known because psychological and behavioral effects of marijuana often occur after the blood concentrations of THC have peaked and returned to very low levels (Refer to the Mason and McBay 1985 study for more discussion regarding the complicated relationship between performance and THC concentrations.)

It also is not known whether the incidence of marijuana and cocaine among these truck drivers is similar to that among other, similarly aged males in the general population. However, the presence of these drugs in truck drivers should still be of concern, because operators of commercial vehicles—airline crews, train operators, as well as truck drivers-have special responsibilities for the safety of others. As described in the introduction, the serious consequences of tractor-trailer truck crashes occur overwhelmingly to the occupants of passenger vehicles and other road users, not to the truck drivers.

Table 9. Confirmed Test Results for Sympathomimetic Amines*

Specimen Number	Urine Results**				Blood/ Serum Results***					
	A/MA	PPA	E	PE	A	MA	P	PPA	E	PE
529	-	+	-	-	no blood					
531	-	+	-	-	-	-	-	-	b=283	-
532	-	+	-	-	no blood					
534	-	+	-	-	-	-	b=97	-	-	-
536	-	+	-	-	-	-	-	b<50	b=243	-
538	-	+	-	+	-	-	-	-	-	-
546	-	+	-	-	-	-	-	-	-	-
553	+	-	-	-	b=44	.	-	-	-	-
563	-	+	-	-	-	-	-	-	-	-
572	-	+	-	+	-	-	-	QNS	-	s=218
576	-	+	-	+	-	-	-	-	s=116	-
577****	-	-	-	-	-	-	b=217	-	-	-
579****	-	-	-	-	-	-	b=107	-	-	-
584****	-	-	-	-	-	-	b=320	-	-	-
586	no urine		-	-	-	-	-	-	-	b<50
588	-	+	-	-	-	-	-	-	-	-
594	-	+	-	-	-	s=56	-	s=99	s=110	s<50
637	-	+	-	-	-	-	-	-	-	-
644	-	+	-	-	-	-	-	-	-	s=243
646	+	-	-	-	b=295	b=118		-	-	-
648	-	+	-	-	-	-	-	s=59	s=59	-
651****	-	-	-	-	-	-	b=397	-	-	-
653****	-	-	-	-	-	-	b=80	-	-	-
680	-	+	-	-	-	-	-	s=61	s<50	s<50
681	-	+	-	-	-	-	-	-	-	-
701	-	-	+	-	-	-	-	b=38	b=401	b=41
779	+	-	-	-	no blood					
782	-	+	-	-	-	-	-	s=220	-	s<50
783	no urine		-	-	-	-	b=118	-	-	-
792	-	+	-	-	-	-	-	-	-	-
795	-	+	-	-	no blood					
799	-	+	-	-	-	b=58	-	b=58	-	-
804	-	+	-	-	-	-	-	-	-	-
807	-	+	-	-	-	-	b=117	b<50	-	-
811	-	+	-	-	-	-	-	-	-	-
815	-	+	-	-	-	-	-	-	s=86	-
819	-	+	-	-	-	-	-	s<50	-	-
836	-	+	-	-	-	-	-	QNS	-	-
839	-	+	-	-	-	-	-	-	s<50	-
843	-	+	-	-	-	-	-	s<50	s=197	-
853	-	+	-	-	-	-	-	-	-	-

Table 9. (continued)

Specimen Number	Urine Results** A/MA	PPA	E	PE	Blood/Serum Results*** A	MA	P	PPA	E	PE
855****	-	-	-	-	-	b<50	-	-	-	-
886	-	+	-	-	-	-	-	-	-	-
888	+	+	-	-	s=120	-	s=83	s<50	s=73	-
893	-	+	-	-	-	-	-	-	-	-
906****	-	-	-	-	-	-	-	b<50	-	b<50
907	-	+	-	-	-	-	-	-	-	-
913	-	+	-	-	-	-	s=55	s=84	s=86	s<50

*Amphetamine (A), methamphetamine (MA), phentermine (P), phenylpropanolamine (PPA), ephedrine (E), or pseudoephedrine (PE).

**All positive urine results except one were obtained by thin layer chromatography with a nominal detection threshold of 1 mg/ml and confirmed by EMIT (amphetamine, methamphetamine) or gas chromatography (phenylpropanolamine, ephedrine, and pseudoephedrine). Amphetamine in urine for driver 888 was detected by fluorescence polarization immunoassay (FPI) with a nominal detection threshold of 0.3 μg/ml and confirmed by gas chromatography-mass spectroscopy (GC-MS). Note that in some cases, PPA may have been detected as a metabolite of ephedrine or pseudoephedrine.

***Blood or serum samples were tested and quantitated by GC-MS; confirmation for substances not detected in urine was by gas chromatography-nitrogen phosphorus detection (GC-NPD). Positive results are quantitated in ng/ml (s-serum, b=blood). QNS indicates the quantity of serum or blood was insufficient to test for and confirm the presence of the indicated substance.

****Driver whose blood was analyzed on the basis of an unconfirmed finding of amphetamine or methamphetamine in urine by FPI.

Estimating the effect of using stimulants, such as amphetamine, phentermine, or their less potent relatives such as phenylpropanolamine is also complex. It is possible that the occasional use of such substances can enhance performance on some tasks by increasing alertness. However, tractor-trailer drivers may use these drugs to continue on the roads even under conditions of fatigue (Wyckoff, 1979). Use for that purpose is probably not occasional, but frequent and sustained. Such use is potentially dangerous, particularly for amphetamine and methamphetamine, because they have a high potential for abuse and the development of drug dependence. The *Physician's Desk Reference* (1987) lists elevated blood pressure, restlessness, dizziness, euphoria, and headache as side effects and warns that "amphetamines may impair the ability of the patient to engage in potentially hazardous activities such as operating machinery or vehicles." Cessation of use after prolonged use of large dosages of amphetamines or phentermine can result in extreme fatigue and depression, and overdosage may be accompanied by tremor, confusion, and hallucinations. Phenylpropanolamine can also have negative side effects, such as nervousness, dizziness, headache, and elevated blood pressure, when dosages exceed 75 mg per day, the dosage found in one time-release capsule of Contact, an over-the-counter cold medication, or one Dexatrim Extra Strength capsule, an over-the-counter diet preparation (American Medical Association, 1983). Thus, although the use of sympathomimetic amines as stimulants may enable drivers to stay awake for long periods, the potential risk of such use seems quite high for both the safety of other road users and the health of the driver.

SUMMARY

This study has provided the first objective data regarding the use of potentially abusive drugs by tractor-trailer drivers. Altogether, 91 drivers, 29 percent of the 317 who participated in the survey had alcohol, marijuana, cocaine, or prescription or nonprescription stimulants in their blood fluids. Marijuana, alone or in combination with other drugs, was detected in 15 percent of the drivers; cocaine was detected in 2 percent, half of whom also had marijuana. Prescription stimulants, such as amphetamine, methamphetamine, and phentermine were found in 5 percent of the drivers, often in combination with similar but less potent stimulants, such as phenylpropanolamine. Nonprescription stimulants were detected in 12 percent of the drivers, about half of whom gave no medical explanation for their presence. Alcohol was found in less than 1 percent of the drivers.

One limitation of these findings is that 12 percent of the randomly selected drivers refused to participate in the study or provided insufficient urine and blood for testing; the distribution of drugs among these 42 drivers is unknown. In addition, because phentermine was not included in the original comprehensive drug analysis, the incidence of prescription sympathomimetic amines, 5 percent in this study, is probably underestimated. Finally, the results apply to tractor-trailer drivers operating on a major east-west interstate route in Tennessee. Drug incidence among other truck-driver populations are unknown and may be higher or lower than reported here.

ENDNOTES

[1] The driver interview form is available from the authors on request.
[2] Blood samples from all drivers whose urine tested positive for amphetamine or methamphetamine by the TDx assay were analyzed by CTI for sympathomimetic amines whether or not the urine test was confirmed.
[3] The TDx fluorescence polarization immunoassay screening for amphetamine and methamphetamine produced a large number of positive indications of amphetamine or methamphetamine as did the radioimmunoassay performed by CTI on 25 other urine samples. Although most of these results were not confirmed (in urine) by GC-MS, simultaneously analyses of corresponding blood samples did find and confirm the presence of other sympathomimetic drugs that are reported here. In addition, there were occasions when the blood of drivers whose urine was positive for phenylpropanolamine, ephedrine, or pseudoephedrine were negative for these substances, but positive for phentermine, or amphetamine/methamphetamine. The cases are also included. Individual results of the tests for sympathomimetic amines are shown in Table 9, including blood concentrations of detected substances.
[4] Section 12008 of the Commercial Motor Vehicle Safety Act of 1986 requires the National Academy of Sciences to study the appropriateness ofreducing the blood alcohol concentration above which it is illegal for commercial drivers to operate. The Act requires the per se level to be reduced below 0.10 g/dL by 27 Oct. 1988. If a reduction is not in effect by then, the per se level for commercial drivers will automatically become 0.04 g/dL.

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Drug Use Trends in a Nuclear Power Company: Cumulative Data From an Ongoing Testing Program

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INTRODUCTION

Southern California Edison operates the San Onofre Nuclear Generating Station, a multireactor facility which presently produces roughly 20 percent of their total power output. The facility is located on a Pacific coast bluff overlooking the ocean about half way between Los Angeles and San Diego. Reactor #1, the first of San Onofre's three nuclear generators, began commercial operations in 1968. It required few personnel and used access control procedures similar to those of a typical fossil fuels plant. Born in the social environment of California in the late 1960s, a comprehensive substance abuse program for reactor #l's personnel was far from anyone's mind.

As time passed, public awareness of the effects of substance abuse on the workplace grew. The Employee Assistance Program (EAP) movement was one response to this recognition. Southern California Edison established its own EAP in 1977. In certain industries, however, the effects of substance abuse on operational safety require extraordinary measures. Such is the case in the nuclear power industry.

Southern California Edison's EAP was its primary defense against company-wide substance problems in the late 1970s and early 1980s. In October 1982, Edison's management became formally involved in the effort: the corporate policy statement was revised to establish a policy on possession or use of alcohol and drugs, and an attempt was made to define "fitness for duty." Things were also changing at the San Onofre site.

In August 1983 and April 1984, reactors #2 and #3 began commercial operations at San Onofre. Their vastly more complex and powerful design demanded rigorous security measures and a concomitant assurance of the public safety. So, in January 1984, Southern California Edison began company-wide pre-employment drug screening via urinalysis and, in September, implemented a drug screen urinalysis for anyone with unescorted access to Protected and Vital areas at San Onofre.

EVOLUTION OF DRUG SCREENING

San Onofre's first effort at drug screening took a moderate line. It might be called the "California Model," since it reflected an attempt to strike a balance between concerns about substance abuse and the personal liberties addressed in the California Constitution. From October 1,1984 through November 30, 1986, employees granted unescorted access to Protected and Vital areas were required to submit a urine sample yearly, at the time they qualified for their Red Badges. This effectively meant that they had a full twelve months notice of the date they were to be screened. In the event their annual test revealed illegal drug use, they were placed on a periodic drug monitoring program, received supervisory counseling and a voluntary EAP referral, and were reassigned during a "cleanup" period. Employees failing a second drug screen received a B-day suspension, and a letter encouraging rehabilitative treatment was placed in their file. A third failure brought a 30-day suspension and mandatory rehabilitation. The fourth brought severe discipline, usually dismissal.

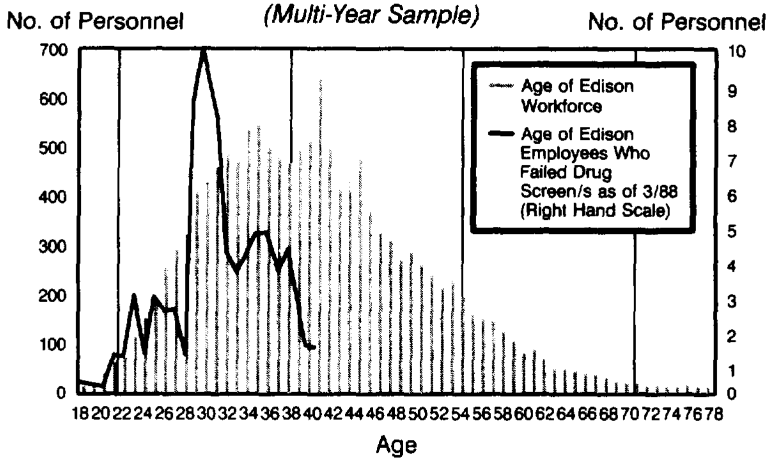
It soon became clear that substance abuse was not eliminated at San Onofre. Screening results began to show that the "California Model" was an insufficient deterrent to illegal drug use. Thus, on December 1,1986 Southern California Edison instituted a "Three Strike" program.

Originally, the Three Strike" approach included unannounced testing. This differed from true random testingby relying on a secret anniversary testing date of which the employee was unaware. Unfortunately, this unannounced component was quickly blocked by the courts. Other facets of this program remained in effect until the dissolution of the court's injunction in November 1988. Essentially, it was simply a tougher version of the original "California Model," mandating treatment after the second failure and dismissal after the third.

RESULTS OF DRUG SCREENING

The empirical data derived from these two non-random drug screening programs follow. For simplicity's sake, the results of both programs are combined for analysis.

Figure 1
DRUG SCREEN FAILURES
EDISON PERSONNEL
(Multi-Year Sample)



As Figure 1 illustrates, no Southern California Edison employee over 40 years old had ever failed a drug screen as of March 1988. It is also clear that employees born between 1953 and 1960 are markedly vulnerable to substance abuse problems. (Note the two vertical axes and their referents.)

Figure 2
DRUG SCREEN FAILURE RATES
(BADGE-RELATED)

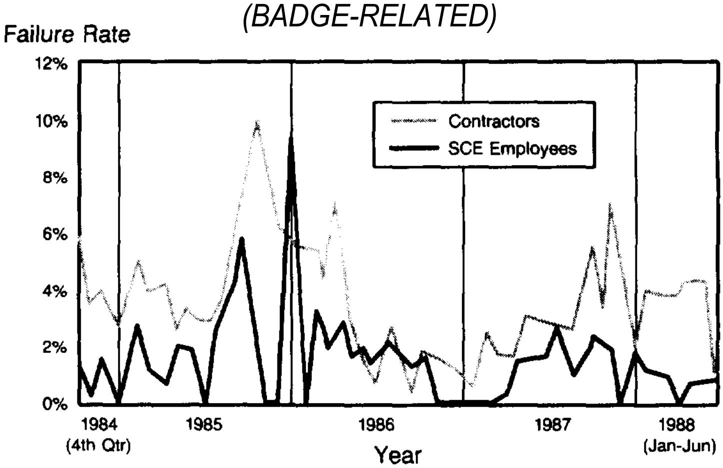
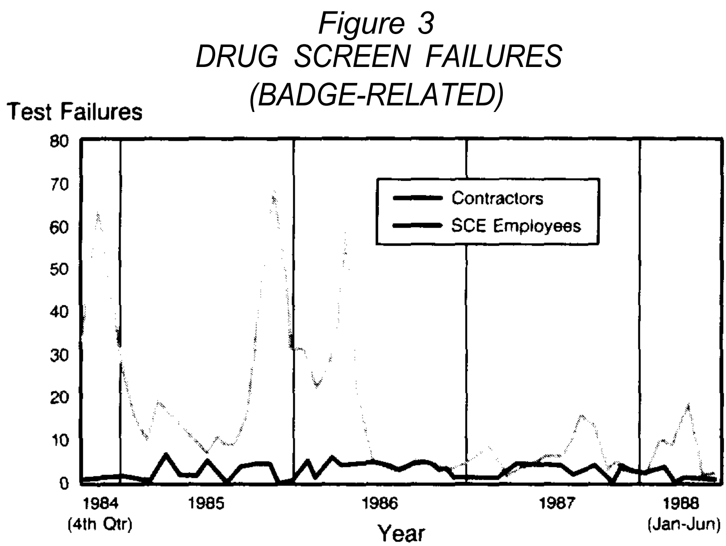
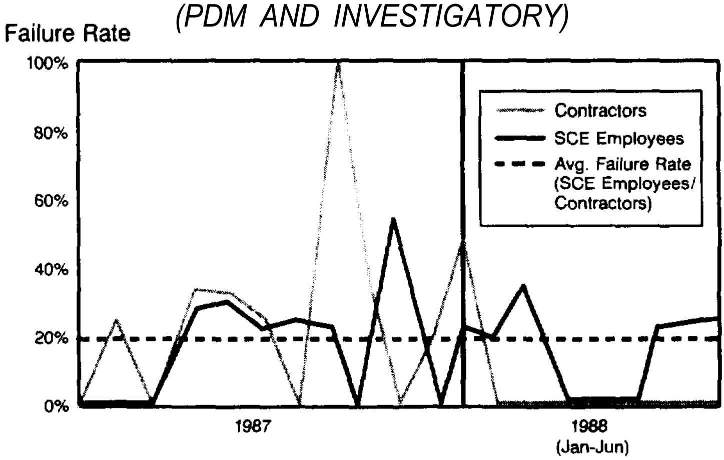


Figure 2 shows the failure rates for personnel with unescorted access to the Protected and Vital areas at San Onofre (Red Badge holders). Since Figure 2 shows a failure rate, it is affected by the absolute number of drug screens administered during any given time period. For example, if only two screens were given and both were failed, the failure rate would be 100 percent. In addition, the rates in Figure 2 were generated from the combined results of drug screens performed for several different reasons. These include routine Red Badge screens, investigatory screens performed "for cause," those given as part of periodic drug monitoring programs, and screens given after accidents on the job. Failure rates for some of these screening categories are quite high. These facts combine to give an informative but complex overall picture. Subsequent Figures will illustrate more specific trends.



In contrast to Figure 2, Figure 3 illustrates actual numbers of failures rather than failure rates. As in Figure 2, however, the absolute number of drug screens administered affects the absolute number of failures. When compared to Figure 2, the contrast between the absolute number of failures for contractors and employees becomes clearer.

Figure 4
UNANNOUNCED TESTS FAILURE RATE
(PDM AND INVESTIGATORY)



(In Figure 4, PDM = Periodic Drug Monitoring; Investigatory = confirmed allegation or observation of drug use or involvement initiating an investigatory screening.)

As noted above, certain categories of drug screens have high "hit" or failure rates. This phenomenon is illustrated in Figure 4. The high failure rates for contractors in August, 1987 and employees in October, 1987 result from the fact that, of the people who were already classified as "involved" with drugs and who were called in for unannounced tests during these months, most failed. The actual numbers involved are very small because, like Figure 1, they illustrate failure rate, i.e., the percentage of those tested who failed.

Figure 5
CAUSES OF DRUG SCREEN FAILURES (BADGE-RELATED)

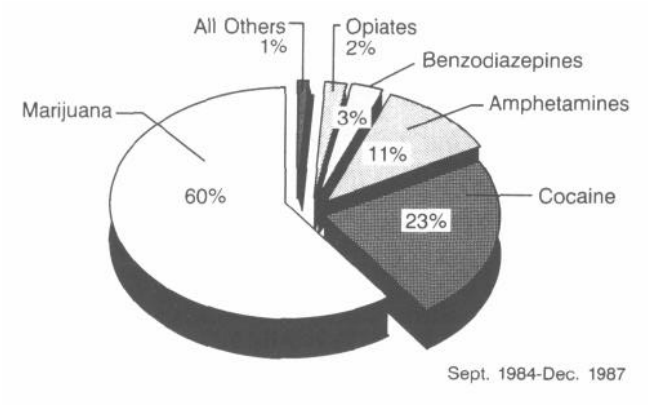


Figure 5 is a visual representation of the various drugs detected by Southern California Edison during the first three years of their drug screening program for Bed Badged workers. While these drugs and their relative proportions are generally similar to those obtained in nationwide studies of substance abuse, there is a special problem with amphetamines. Unfortunately San Diego has a number of outlaw amphetamine laboratories. The location of San Onofre places its employees within the distribution area for inexpensive, easily purchased methamphetamine.

Figure 6
PERCENT OF TOTAL DRUGS DETECTED INDRUG SCREEN FAILURES BY SCE EMPLOYEES

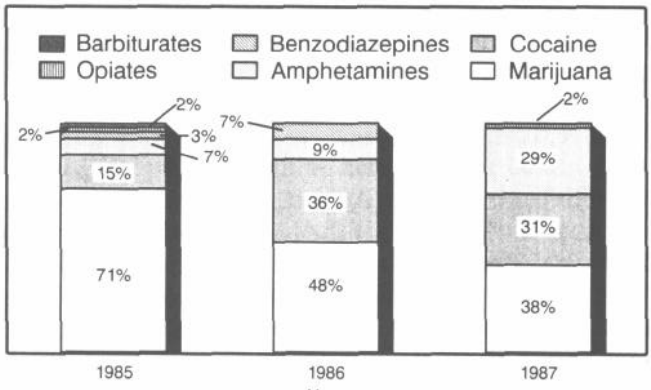


Figure 6 breaks down the commonly abused drugs by year and employer, showing the yearly toll of Southern California Edison employees. Note the decreasing use of marijuana, the increase then slight decrease of cocaine, and particularly the startling increase in illegal amphetamine use, especially given the short duration of its detectability via urinalysis.

Figure 7
PERCENT OF TOTAL DRUGS DETECTED IN DRUG SCREEN FAILURES BY CONTRACTORS

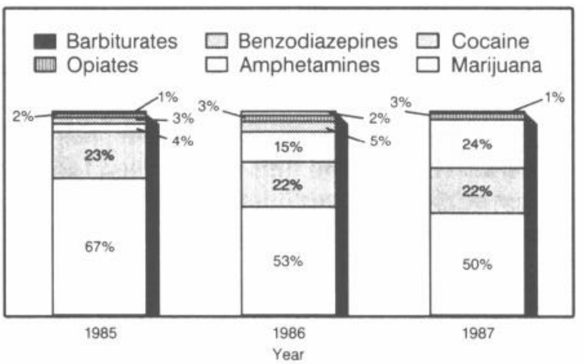


Figure 7 presents the same analytic format as Figure 6, but it illustrates the drugs abused by contract workers. Generally, the profiles are similar.

Figure 8
RECIDIVISM IN EMPLOYEES AFTER ONE DRUG SCREEN FAILURE
(September 1984-June 1988)

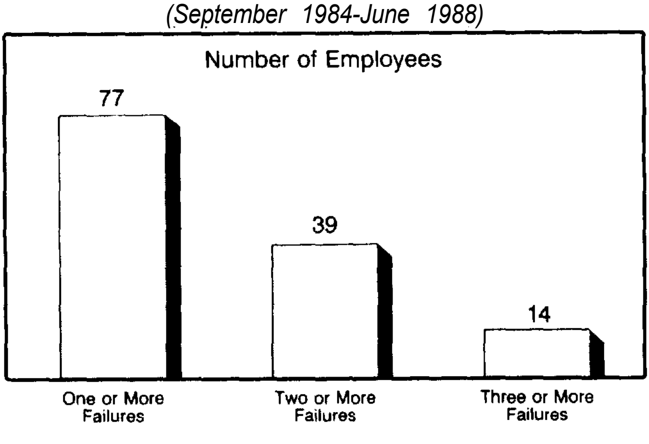
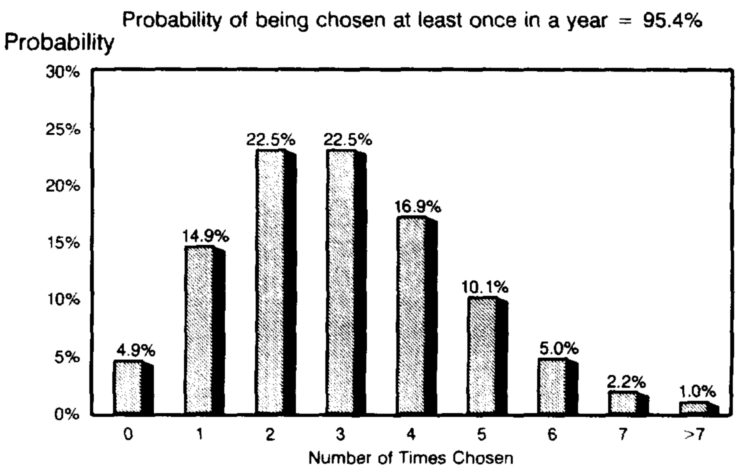


Figure 8 is most sobering. It reflects recidivism among employees involved in substance abuse. There is a recidivism rate of 51 percent for second failures and 36 percent for three or more. In spite of the employees knowing when they were going to be screened for their access authorization, a group of them failed. Further, once they had failed their first test, they knew they would be placed on a periodic drug monitoring program, yet more than half could not stay drug-free, and over a third failed three or more times. Clearly, a change was warranted.

RANDOM TESTING PROGRAM

San Onofre Nuclear Generating Station's random testing program was implemented on November 7,1988. This "Two Strike, Random Model" is conceptually quite simple. Drug screens are performed on Bed Badged employees on a random basis. The first drug screen failure results in a 14-day disciplinary suspension, mandatory rehabilitation, and a periodic drug monitoring program. The second failure brings dismissal.

Figure 9
300% SIMPLE RANDOM SAMPLING

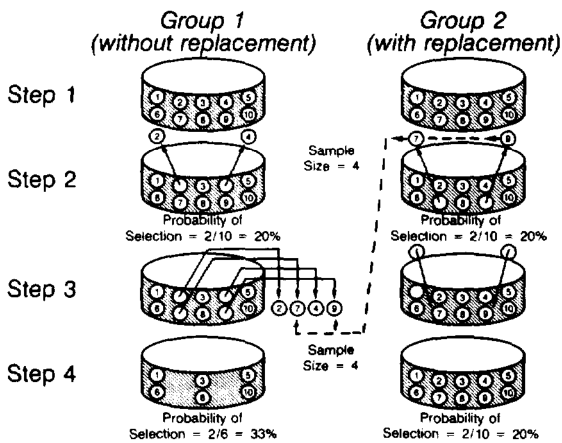


While conceptually straightforward, operationalizing a random testing program is a bit more complex. The random aspect of Edison's model is based on the use of commercially available, random number generation software. Its accuracy was validated via Chi-square testing performed by their Planning and Research Division. Then, all individuals who had active Red Badges were included in the universe of possible selections. While this number varies substantially according to periodic refueling needs, about 3,000 Red Badges are valid on any given day. Next, a program was created to match the numbers generated by the random number generator to a master list of Red Badged employees. Whether an employee is selected for testing depends on the correspondence between the random numbers and the employee's position on the master list.

Initially, a simple random distribution was chosen as a testing model. Unfortunately, this model proved very expensive and inefficient. An annual testing rate of 300 percent of the universe of Red Badged employees achieved an acceptable probability distribution at the bottom and middle of the curve (Figure 9, the left and middle of the graph), However, it created a very high proportion of people who would be tested so often that severe work disruption and adverse personal reactions would occur. This approach was also estimated to cost a great deal.

One of Southern California Edison's statisticians, Dr. Craig Murray, created an excellent alternative approach he calls Composite Random Sampling (Figure 10) (Murray and Talley, 1988).

Figure 10
COMPOSITE RANDOM SAMPLING PRINCIPLE

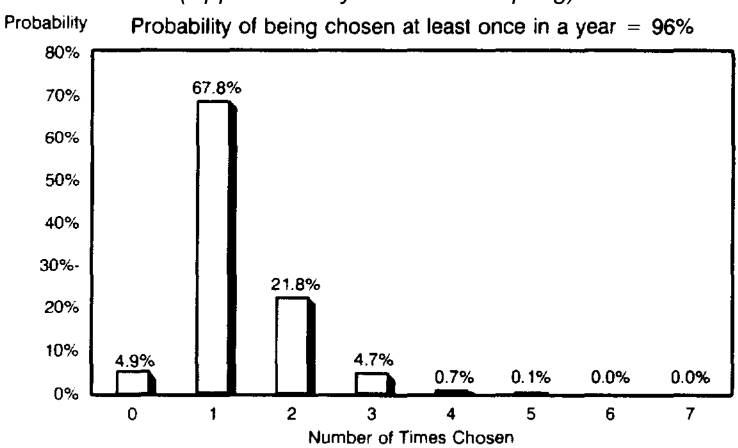


His strategy uses two basic groups of Bed Badged personnel. The first group includes all employees and contractors who have not been screened within the last year. The second includes all badged personnel, regardless of their screening status. On any given testing day, half the tests are performed on the members of the first group, the other half on the second.

Group number one is sampled without replacement, meaning that as people are picked, their names are removed from the group for a year. This technique increases the chance that the remaining people will be chosen from this group over time. After the first year, those people not sampled for a year are returned to group number one in order to insure a minimal yearly testing rate.

Group number two is sampled with replacement, and includes the entire universe of Bed Badged employees. Each person chosen from this group is tested and returned to the group, providing the continued deterrence of exposure to further testing. The actual selection rate from group number two can be much lower than with simple random testing, since the use of group number one establishes an acceptable base probability rate. After an initial start-up period of a year, the size of both groups stabilizes.

Figure 11
COMPOSITE RANDOM SAMPLING
(Approximately 130% Sampling)



When the sampling parameters are adjusted to meet San Onofre's needs, the Composite Random Sampling approach generates the curve above (Figure 11). It provides a large chance that employees will be tested at least once per year but small chances that they will not be tested or that they will be tested more than three times. This approach also has a much smaller impact on productivity, generates less employee frustration and resentment, and costs less than one-third as much as simple random sampling.

While it is too early to present data from the "Two Strike, Random Model," preliminary indications look promising. At this writing, it is running smoothly after about a month of start-up work. While some difficulty inevitably follows the implementation of a nonvoluntary drug screening program, the structure and impartiality seem clear to all.

SUMMARY

This article has traced the evolution of Southern California Edison's San Onofre Nuclear Generating Station (SONGS) from fledgling nuclear facility to one of the largest nuclear power installations in America. Paralleling this growth has been an increasing sophistication and commitment to preserving the public trust through efforts to eliminate substance abuse in the workplace. Southern California Edison's substance abuse program has grown and changed in many ways. The results of this change were presented through datagathered at SONGS. These efforts continue to be directed toward an ultimate goal-the creation of a truly drug-free workplace. Work continues.

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Drug Monitoring in the Workplace: Results From the California Commercial Laboratory Drug Testing Project

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California Drug Abuse Information
and Monitoring Project (DAIMP)

INTRODUCTION

Drug use in the United States work force has recently become the object of public and governmental concern. In 1987, the California Department of Alcohol and Drug Programs provided funds for the UCLA Drug Abuse Information and Monitoring Project to augment the State's drug abuse monitoring systems by compiling and analyzing data from commercial laboratories that perform urinalysis tests for drugs of abuse. The California Commercial Laboratory Drug Testing Project (CCLDTP) receives monthly urinalysis results from four high-volume laboratories. Test results provide information on drug use trends and patterns in the criminal justice system, drug treatment programs, the medical community, and industrial employers throughout the State.

First-year results indicate that detected rates of drug use were lowest in employment samples. Detected rates in these samples were highest for the most socially accepted drugs such as marijuana and alcohol, and lowest for less acceptable drugs such as cocaine, opiates, and amphetamines. Although detected rates for drugs that produce medical complications were somewhat higher in the medical samples than in the employment samples, in general, illicit drug use was low in both populations. Detected rates for illicit drug consumption were highest for criminal justice system samples and drug treatment program samples. The study results indicate the worth of utilizing already existing information from drug testing laboratories to monitor drug abuse trends across specific populations. However, the low rate of positive specimens in the work force samples raises questions as to the costs and benefits of drug testing compared to alternative methods of identifying and assessing drug abuse problems in the workplace.

BACKGROUND

Employees with substance abuse problems, including tobacco and alcohol, cost American industry an estimated $60 billion a year. Annual wages lost to cigarette-related illness alone are about $3 billion, and about 32 million workdays and $8.6 billion in wages are lost annually to heart-related diseases (Chadwick, 1979). Chadwick estimates that these high costs can be attributed to absenteeism, hospitalization, and early death among executives. It is estimated that premature death alone costs American industry $19.4 billion per year, a sum which totals more than the combined profits of Fortune's top five corporations in 1976. Chadwick calculates that employers' costs for life and health insurance have increased eightfold in the last two decades, and that a disproportionate amount of this increase is related to substance use.

Although these health costs are impressively large, they alone do not justify testing for illicit drugs; a large part of these costs is generated by nicotine and alcohol-ironically the drugs our society promotes and endorses.

Public and private employers, from Fortune 500 companies and large government agencies to small businesses, are scrutinizing drug abuse problems as they apply to their own employees. Detection mechanisms, from supervisor or co-worker reports to highly systematic urinalysis programs, are under development and review. Many companies reject drug testing because of problems with invasion of privacy, inaccurate results, use versus abuse issues, cost, and management, employee, or union opposition.

Despite its controversial nature, drug testing has become overwhelmingly popular in the United States. Urinalysis is currently used to test individuals for the presence of drugs from a variety of populations. Individuals tested include job applicants and employees being monitored by their employers, as well as those in the criminal justice system, drug treatment, and medical settings.

Why has testing become so popular not only in traditional problem groups but now in the workplace? As drug use has become more widespread public awareness of its social costs has also grown. Furthermore, recent public and governmental concern over the extent of drug use in the work force has focused not only on public safety, but also on the effects of drug use on productivity, profitability, and health care costs. The apparent failure of numerous anti-drug campaigns has created a sense of helplessness. Testing and providing consequences for a positive drug test are tangible acts that the public believes will deter drug use.

The question remains, however, as to whether the financial and social costs of testing in all these varied groups are justified by the results? Are we as a society getting what we want from the use of urinalysis to identify drug users in the work force?

The Controversy Over Testing

The use of drug testing in the Criminal Justice System (CJS), by drug programs to monitor client compliance, or for medical purposes is relatively well accepted. However, outside of these areas, and especially in the area of employment, drug testing is viewed as an infringement of the fundamental right to privacy. Should an employer have the right to test an employee whenever he chooses to do so, even if there is no reason to suspect drug use? Should the employer be allowed to use a negative drug test as a criterion for employment? Do these uses of urinalysis constitute an infringement of the employee's rights? On the other hand, does an intoxicated employee have the right to endanger the public or to cost taxpayers additional health dollars for the treatment of drug-related conditions? Should the employer have the right to maintain standards of public safety and cost-effectiveness? Should alcohol or tobacco be viewed differently than prescribed medications or illicit drugs? These are the kinds of questions which surround the drug testing issue.

The reasons for using urinalysis to test employees for the presence of drugs are varied. Drug tests are used to detect employees who may be using drugs; deter employees from drug use; or detour employees from the workplace into treatment or even unemployment.

The central issue is whether drug testing for detection, deterrence, and/or detouring is an effective way to deal with drug use and abuse in the work force. This issue can only be resolved by careful cost/benefit analysis based on empirical evidence. Social and government interest in deterring drug use in the workplace follows the military's well-publicized and reasonably effective suppression of drug use by military personnel with an effective implementation of a testing policy.

Monitoring Systems

To base social policy on empirical evidence, we need to know more about drug consumption in the population. A number of indirect indicators of the extent of drug abuse are provided by several epidemiological databases; however, even taken together, the data collected in these databases provides an incomplete picture. The National Institute on Drug

Abuse (NIDA) Household Survey, for example, gives probably the best estimates of drug use in the general population, but this survey omits several subpopulations such as transients, institutionalized persons, and the homeless. The Annual High School Survey conducted by NIDA collects data on drug use prevalence among high school seniors. This survey is flawed by the fact that a higher proportion of high school dropouts than of seniors are substance users. Data available from NIDA's Drug Abuse Warning Network (DAWN) System on drug-related emergency room visits and medical examiner reports of drug-related deaths monitor the severest consequences of drug use, but are not particularly useful for making absolute prevalence estimates of drug use. Other indirect indicators are provided by treatment admissions figures from State and Federal agencies, public health reports, and records of drug-related arrests. Two recently developed drug surveillance systems are the Centers for Disease Control (CDC) Controlled Substance Analog Surveillance Committee, which monitors reports of synthetic drugs, and the National Institute of Justice (NIJ) Drug Use Forecasting (DUF) project, which monitors drug use trends among arrestees in major U.S. cities by survey and by urinalysis.

As is evident from this partial list, each of the drug surveillance systems provides a small piece of the total picture of drug use and abuse in the United States. However, each has its limits; the information provided by these systems must be interpreted with caution.

The California Commercial Laboratory Drug Testing Project

The California Commercial Laboratory Drug Testing Project (CCLDTP) was established in 1987 by the California Department of Alcohol and Drug Programs to augment the current monitoring systems by capitalizing on the availability of drug testing data from commercial laboratories that perform urinalysis tests for drugs of abuse in different populations. By analyzing urinalysis data from commercial laboratories, the department was able to add another source of epidemiological data to contribute to our total picture of the extent of drug abuse. Because urinalyses are performed for employee and job applicant drug testing, as well as for criminal justice system and treatment program clients and medical patients, we can begin to develop accurate information on drug use and abuse in the workplace.

The epidemiology of drug use in the work force has not yet been adequately described. Government and industry policies have emerged more from the current climate of social intolerance for drug use and apprehension about liability than from empirical knowledge. While such groundswells of public opinion are necessary to generate a common consensus for action, they do not produce reasonable social policy unless the action taken is based on appropriate research findings.

The CCLDTP collects the results of completed urinalyses from commercial laboratories and analyzes them to learn what drugs are most commonly used, how many tests are positive, and whether differences exist in the urinalysis methods used to assess drug use trends among the populations studied.

The first year's data collection and analysis from the CCLDTP has been completed. These data support a comparison of the pattern of consumption in employment populations with those found in the other populations. Findings are presented in the Results section of this paper, and the implications of these findings for public policy are assessed.

DESIGN AND PROCEDURES

The CCLDTP was designed primarily to establish a cost-effective means of monitoring drug abuse trends in selected California populations. The selection of laboratories was based on a number of criteria developed by the State Department of Alcohol and Drug Programs, the UCLA Drug Abuse Information and Monitoring Project (DAIMP) research staff, and drug testing experts. Laboratories were selected for high volume, a varied client base, and willingness to cooperate with the study. Other important criteria included specimen handling methods, turnaround time for reporting results, and general professional standards.

Three major commercial laboratories—American Clinical Laboratory, PharmChem Laboratory and Reference Laboratory-began contributing data to the CCLDTP in April 1987, and a fourth—BPL Laboratory—joined the project in June 1987. The four laboratories process approximately 66,000 tests per month, collectively. Each laboratory receives minimal financial compensation to cover direct labor costs related to the acquisition and collation of data and the minimal programming costs required to upload the data to the DAIMP facility. The project does not interfere with the daily routine of the laboratories.

These four laboratories supply the CCLDTP with data on urinalysis results for a variety of clients throughout California. It is important to note that the types of agencies that request urinalysis vary, as do the types of drug screens they request. The types of clients represented in the test results include employed individuals, individuals applying for employment, criminal justice system clients, individuals in drug treatment programs, and hospital and other medical patients.

Specifically, the populations for whom test results are analyzed by the CCLDTP are as follows:

- Workplace testing
  - Preemployment screening (GS)
  - Employment testing for cause (IC)

- Drug treatment programs
  - Drug treatment programs-general screen (GS)
  - Patients in privately-funded methadone clinics
  - Patients in drug-free treatment programs (DF)

- Hospital Testing
  - General hospital screening (preoperative, blood chemistry, and special requests) (GS)
  - Physicians' office-general screen (GS)

- Clinical Laboratories
  - Clinical lab—general screen (GS)

- Criminal justice system (CJS) testing
  - Prison
  - Parole
  - Probation
  - Community treatment (halfway houses, residential treatment, and work release programs)

Laboratory Integrity and Confidentiality

Under the current format of aggregate data collection, the CCLDTP obtains no identifying information from the commercial laboratories on individual urinalysis subjects or on organizations requesting the tests.

Commercial laboratories participating in the CCLDTP maintain the highest professional standards of confidentiality with respect to their client test subjects. The CCLDTP also maintains strict security measures in the processing and handling of data. The use of aggregate data tiles and extensive coding systems ensures that no identifiable or traceable data can be linked with a particular client name or individual specimen sample. Furthermore, access to the data files is limited to authorized personnel.

Drug Screens

The CCLDTP receives data for the following classes of drugs: alcohol, amphetamines, barbiturates, benzodiazepines, cannabinol, cocaine, methaqualone, opiates, and propoxyphene.[1] Due to the varied reasons for testing, not all drug classes are represented at all laboratories or for all client organizations. Changing trends in drug use may promote the inclusion of more drug types and their analogs in general drug screens at a later date.

Limitations of the Data

Like several other drug indicator systems, the CCLDTP gathers information in the aggregate. This allows investigators to monitor drug consumption in the groups sampled, but does not support direct estimates of levels of use within the groups or extrapolations of results to other groups.

One limitation of the CCLDTP data is the lack of complete demographic information. The data on gender are minimal, and age or ethnicity data are not available. Where gender information is obtained, the ratio of males to females is approximately 10 to 1 for populations with significant drug use levels. When sample sizes differ to this extent, it is difficult to provide a stable gender comparison. Given these data constraints, analyses can be reliably conducted on only two variables: client type (e.g., employees, drug program clients, parolees, etc.) and geographic location. Geographic location information is so varied and widely dispersed that reliable analyses must be conducted with predetermined area groupings. The results of these analyses are still pending.

The generalizability of the client type results is also limited by sample bias. Bias occurs in part because the sampling is not always random, since “for cause” testing is common. Some clients also use the laboratory facilities to confirm results of an earlier drug screen (although approximately 85 percent of the samples are for initial test submissions). Thus, the data trends may be skewed toward a higher percentage of positive screens, and these trends must be interpreted cautiously. Inferences about levels of drug use (i.e., the number of positive samples) can be made only with regard to these populations and perhaps only for the clients of a particular laboratory. However, changes in drug trends over time within each population can be interpreted with confidence.

RESULTS

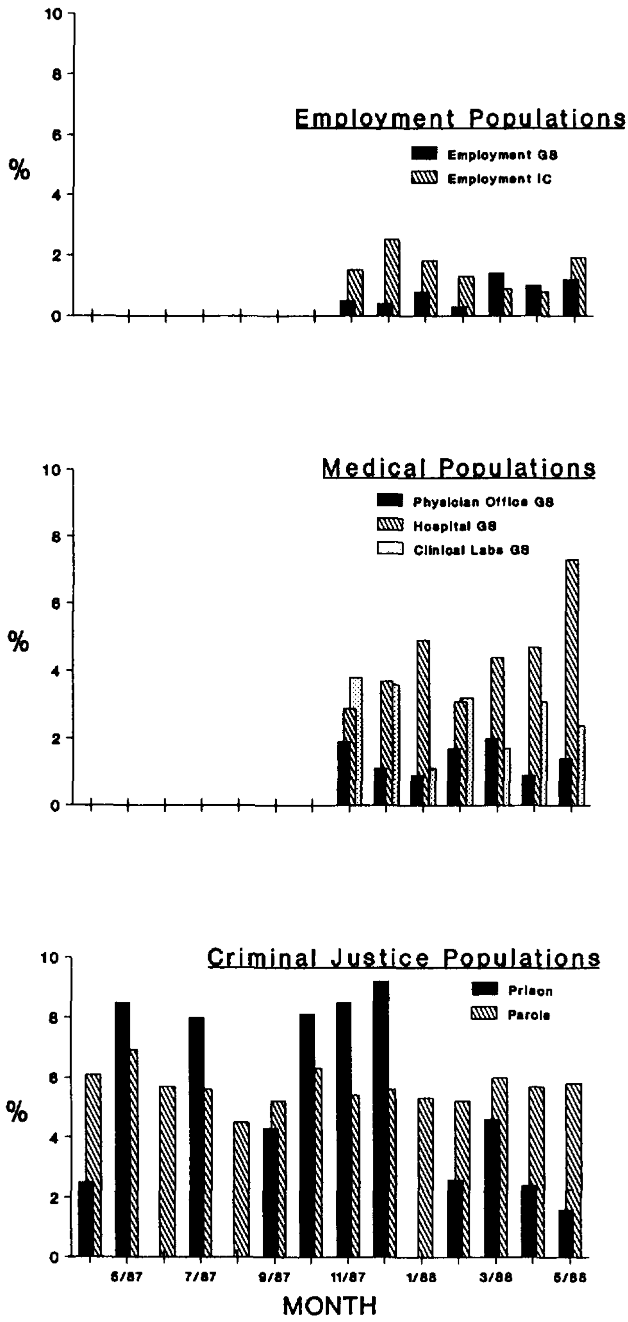
The CCLDTP has completed its first year of data collection (April 1987 through May 1988) and is able to describe drug trends in selected populations. Figures 1 through 5 present time series data on monthly results for the five most frequently detected drugs: alcohol, THC (presumably marijuana), cocaine, opiates (presumably heroin), and amphetamines. The categories were arranged to group similar clients. However, these groupings may not be as homogeneous as they appear, because of differences in definition of client types between the laboratories. But because the data are reported from consistent cohorts, the material presented is useful in trend analyses. When comparing results for drugs examined it is important to note the differences in chart ranges.

Figure 1 displays the percentages of the employment, medical, and criminal justice populations that tested positive for alcohol. (Drug programs do not typically test for alcohol). In the employment sample, approximately 0.5 percent to slightly over 2 percent of the tests were positive; the medical population shows a positive range of 1 to 7 percent; and the criminal justice population showed a range of approximately 1.5 to 9 percent—the most activity of the three client populations. Although alcohol has been described as the most abused drug, the percentage of alcohol positives in the CCLDTP employment populations was low. It would seem that for the most part, individuals who abuse alcohol do not do so at work.

Figure 2 presents positive test results for THC (marijuana) among three client populations: employment, drug treatment, and criminal justice, (medical services do not typically test for THC). The employment population shows positive results from 1.5 to 7.5 percent of the tests. The drug treatment exhibit, ranging from approximately 3 to 12 percent, is based on relatively few data points, since marijuana tests are not requested frequently for the drug treatment population. The criminal justice population reveals a large amount of activity, ranging from 3 to 34 percent depending on the type of client.

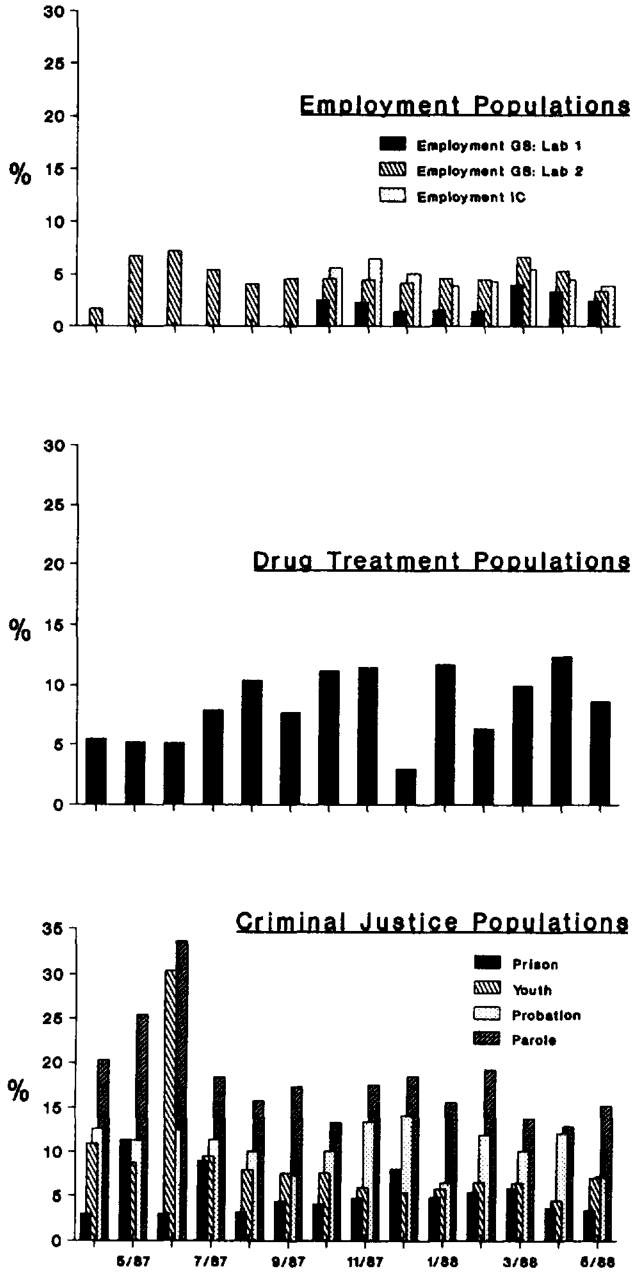
Figure 3 compares the percentages of the employment, medical, criminal justice, and drug treatment populations testing positive for cocaine. In the employment population, cocaine is at the lowest range detected, at 0 to approximately 2 percent. Positive test results in the medical population range from 1 to 6 percent. The criminal justice system population illustrates very distinct and very steady trends for different types of clients. The prison population ranges between 0 and approximately 2 percent, the probation population between approximately 2 and 10 percent; the California Youth Authority (CYA) parolee popula-

Figure 1. Percent testing positive for alcohol



Note: Missing bars indicate insufficient or missing data

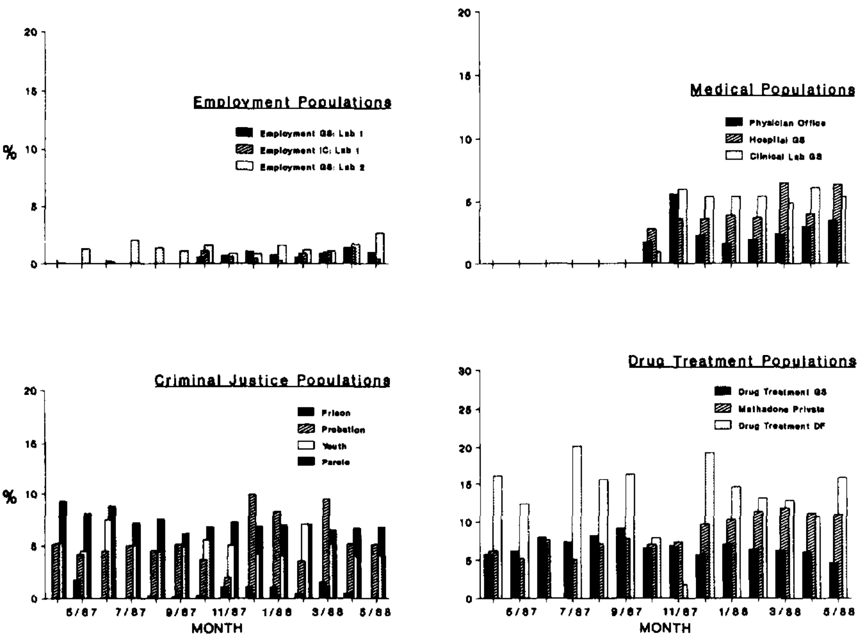
Figure 2. Percent testing positive for marijuana



Note: Missing bars indicate Insufficient or missing data

tion between approximately 4 and 8 percent while prison parole clients range between approximately 7 and 9 percent. The drug treatment samples show consistent positive cocaine test results, ranging between approximately 5 and 9 percent for general drug treatment and 5 to 12 percent for methadone treatment. Considerable fluctuation occurs in the drug-free treatment group, with ranges from approximately 2 to 20 percent.

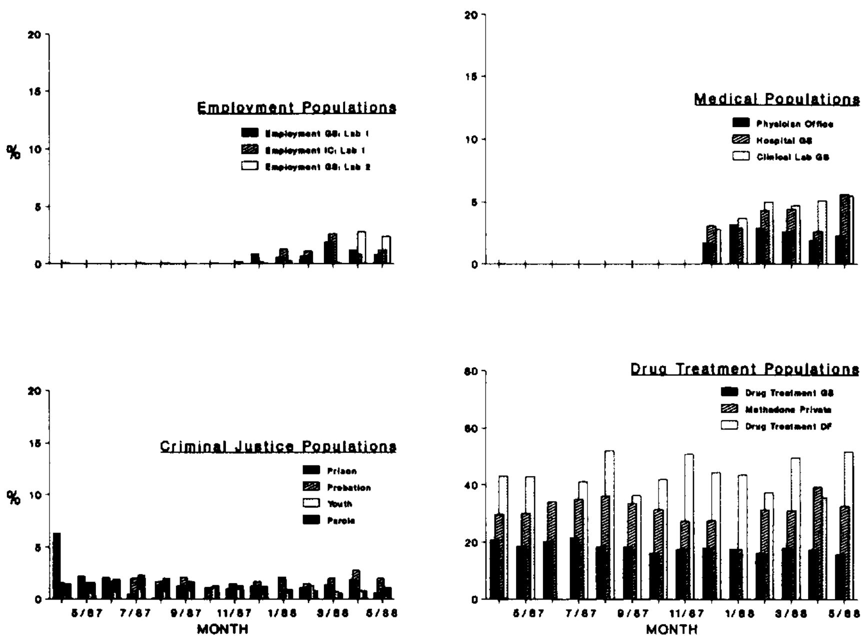
Figure 3. Percent testing positive for cocaine



Note: Missing bars indicate insufficient or missing data ----- chart ranges vary across populations tested

Very low rates of opiates were found for most populations in the CCLDTP test results, as is shown in Figure 4. Most individuals who tested positive for opiates (most often heroin) were in treatment programs (16 to 50 percent of the various drug treatment populations), whereas only 0 to 6 percent of the employment, medical, and criminal justice populations tested positive for opiates.

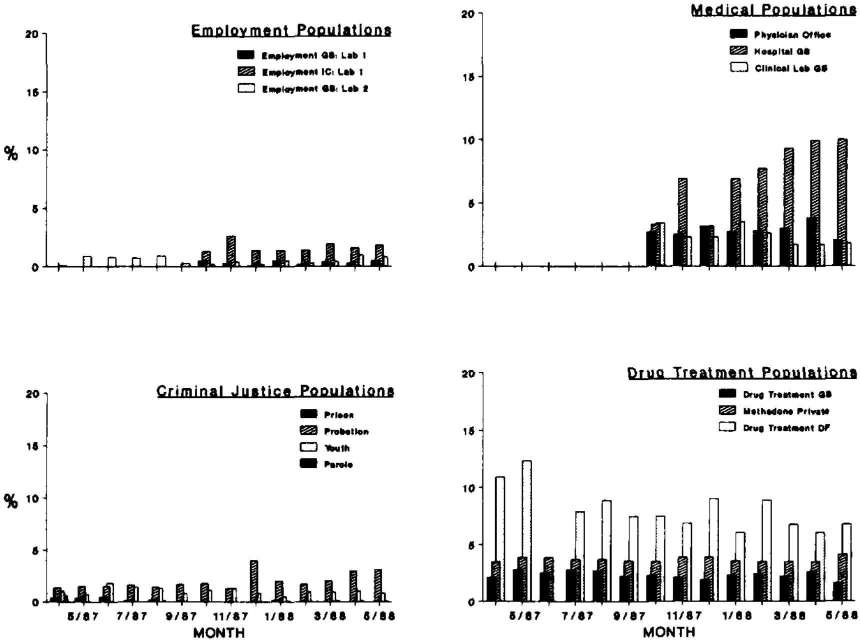
Figure 4. Percent testing positive for opiates



Note: Missing bars indicate insufficient or missing data ----- chart ranges vary across populations tested

As shown in Figure 5, amphetamine use in the employment and criminal justice populations was low, with a range of 0 to 4 percent. Higher positive rates are seen in the medical population (2 to 10 percent) and in the drug treatment population (2 to 12 percent) (Figure 5).

Figure 5. Percent testing positive for amphetamines



Note: Missing bars indicate insufficient or missing data

CONCLUSIONS

The importance of basing social policy on empirical evidence rather than on a few highly publicized incidents cannot be overstated. As the use and abuse of drugs has spread throughout our society, public policy for dealing with drugs has often been based on guesswork and outrage rather than on solid research. Even with the variety of drug use monitoring systems we now have available, there is much that we do not know about patterns of drug use in the general population.

Using existing urinalysis data, the CCDLTP has now established a baseline of positive tests for various drugs of abuse for four broad segments of the population: employees, medical patients, drug treatment program clients, and criminal justice system clients. This baseline information can be used to monitor true changes in drug consumption as well as to compare annual and seasonable fluctuations of drug use and abuse. Changes over time can guide agencies in planning their programs, suggest modifications in policy and programs, point to the need for further education for the medical profession, or suggest the development of more extensive Employee Assistance Programs.

Use, Abuse, and Addiction

It is also important to note that a positive drug test does not necessarily reflect abuse. Most substance users are not addicts with a physical dependency. We need methods of dealing with positive test results that fit the user's level of drug involvement. For example, drug addicts require detoxification and treatment, while occasional users may need drug education. Further, the interpretation of a positive test depends on the type of drug used and the length of time since last use. For example, cocaine remains detectable by urinalysis for a maximum of 4 days, whereas marijuana remains detectable for as long as a month after last use. Therefore, a cocaine-positive urine is more likely to indicate recent and possibly dependent use than a marijuana-positive urine, particularly if the individual was aware of the pending analysis and was not able to abstain.

Employee and Applicant Testing

Despite recent well-publicized speculation, the actual extent to which the work force consumes illicit substances is relatively unknown, as are the effects of such consumption. By analyzing existing data on drug test results, the CCLDTP has begun to collect objective evidence about the costs and benefits of drug testing in the workplace.

The first-year results, however, raise serious questions about the value of drug testing in the workplace. When we consider that only 1 or 2 out of each 100 tests in the employee population are positive, and that, due to the limitations previously discussed, even those 1 or 2 positives may represent an overstatement of the actual numbers of positive tests in general, we have to decide whether we really need to test for drugs in employee populations. Although testing may be a deterrent in drug treatment and criminal justice populations, its deterrent effects may be less relevant to employees and job applicants.

Using empirical evidence of drug use trends in the employment populations as a base, we can decide whether drug testing to detect, deter, or detour employees is the kind of social policy we can accept and support.

ENDNOTE

[1] Quantitative Assay Techniques vary across laboratories and drugs. The following assay techniques are used by laboratories to test for the presence of various drugs:

- Thin Layer Chromatography (TLC)
- Enzyme Immunoassay Technique (EMIT)
- Gas Chromatography (GC)
- Mass Spectrometry (MS)
- Radioimmunoassay (RIA)
- High Performance Liquid Chromatography (HPLC)
- Flame Ionization Detector (FID)
- Nitrogen-Phosphorous Detector (NPD)
- Electron Capture Detector (ECD)

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Results of the Drug Testing Program at Southern Pacific Railroad

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INTRODUCTION

In many respects the railroad industry is unique when compared to other industries in the United States. Although there have been substantial technological advances over the years, the basic principle of a steel wheel, being pulled along a steel rail, laid across wooden ties, still remains.

Unions representing railroad workers are among the most powerful in the United States. These unions have helped make railroad employees among the most highly paid workers in the United States. Employees report for duty at all hours of the day and night, at hundreds of different locations throughout their company's rail systems. (Because of this, direct supervision is extremely difficult).

By their very nature railroads are a dangerous place to work. When an injury occurs it can be catastrophic. Trains carrying all manner of potentially hazardous commodities roll through thousands of communities every day and every night of the year. A railroad accident can occur in the middle of a crowded community just as it can in the middle of the desert.

Here is what rail management has faced ever since the driving of the gold spike. Railroad employees:

- Constitute a large number of well-paid, skilled, and semi-skilled employees
- Are away from home for long periods
- Work alone or in small unsupervised groups 24 hours a day

- Engage in tedious and often monotonous tasks
- Are responsible for operating large, fast-moving trains containing virtually every conceivable kind of hazardous material that can take up to a mile to bring to a stop
- Pass through residential and business areas at all hours of the day and night

By anyone's standards, that is a huge safety challenge. Fortunately, there is a long tradition of dedication, loyalty, and responsibility on the part of railroaders. However, the opportunities for employee abuses are endless.

From the beginning of the rail system, management has recognized the potential for drug use under these circumstances. Accordingly, they have prohibited employees from reporting for work with drugs in their systems. This is known as Rule G. Initially, this prohibition was directed to alcohol, but as other narcotic drugs came into use, the rule was expanded to include possession or use of illegal drugs on or off the job and misuse of legal drugs.

Historically, drug testing on the railroad was done by visual and sensory observation. Alcohol was virtually the only drug used on the job until the 1960s, and was by far the most frequently used drug on the job until well into the 1970s.

A comprehensive study of alcohol use by railroad employees was conducted by the U.S. Department of Transportation in 1979. That study found that:

- 75 percent of railroad employees drink
- 25 percent were problem drinkers
- 12 percent drank on duty
- 10 percent drank while subject to duty

For several years, the railroad industry has used blood tests to a limited degree to determine Rule G violations based on reasonable suspicion grounds and following serious accidents. Labor's opposition to drug testing has moderated considerably in the past 8 years. Although a number of unions still strongly oppose testing, more and more are joining in support of testing programs.

Southern Pacific established its present drug testing program in August 1984. Initiation of the present testing plan began after exhaustive analyses of accident and injury reports on our railroad, and careful review of comprehensive Federal Railroad Administration (FRA) data covering the entire industry. It became all too clear that the use of alcohol and drugs was playing an increasingly significant role in major accidents and injuries.

A 1979 FRA study of railroad accidents found that, over the previous 10-year period, alcohol or drugs were involved in:

- 48 major train accidents
- 37 deaths
- 80 injuries
- $34 million damage

This study, while significant, probably identified less than half of the total drug- or alcohol-related accidents during that period. (The tragic Conrail-Amtrak collision in January 1987, in which 16 people were killed and 170 injured, is a dramatic example of the catastrophic results that can occur when drugs are used on the railroad. In that case, the National Transportation Safety Board (NTSB) found that marijuana use by the Conrail engineer was a major contributing factor.)

By 1984, we realized that our longstanding reliance on a program based on trained visual observation of employees and a review of their work records to detect alcohol and drug use was not working. We felt something more had to be done to protect our employees and the public. On the recommendation of our Chief Medical Officer we initiated a program of urinalysis testing. Urinalysis was felt to be the least intrusive and most accurate and reliable test to determine the presence of drugs and alcohol.

Our program includes testing for the presence of alcohol—the most abused drug in the United States. (According to the National Institute on Alcohol Abuse and Alcoholism, 30 percent of all general hospital admissions are alcohol-related.) Our testing program was initially directed to operating personnel, including for example, engineers, conductors, firemen, switchmen, and brakemen. We met with the affected Union General Chairmen in advance and briefed them on our plan to test:

- All applicants for employment, in conjunction with all regularly scheduled physical exams

- Whenever there was “reasonable suspicion” of a Rule G violation. Included in “reasonable suspicion” were all human factor or human error accidents no matter how minor-or major—and vehicular accidents

- Any personnel whose action or inactions may have contributed to an accident or the severity of an accident

- Any personnel involved in a major accident irrespective of obvious cause

The affected unions chose not to challenge this program, although they tiled grievances in individual cases. The program may have been accepted because local leaders and the rank and file generally were aware of alcohol and drug use on the job, and they wanted something done as badly as management. Clearly, there was not sufficient opposition by the membership to support a strike call. As the program progressed, union acceptance grew. Initial concerns of possible harassment proved generally unfounded and operating management voluntarily submitted to testing along with the rank and file, thus dulling the double standard argument.

From the beginning, all positive tests have been confirmed by one or more additional tests. At present, the screens are done by EMIT or by an RIA test. Positive results are confirmed by GC/MS and, for the past year, a second lab has been testing those same samples by HPLC. We have experienced a 100 percent correlation between these two tests.

Test Results Over the Past 3 Years

Urinalysis testing was initiated in August 1984 in our Transportation Department. Three hundred seventy (370) tests were conducted between August-December 1984. Of those tested, 22.9 percent were positive for drugs or alcohol. In 1985, the first full calendar year of testing, 11.6 percent of the 1,388 tests conducted were positive. In 1986, 5.3 percent of 1,519 tests were positive, and in 1987,5.8 percent of the 1,524 tests were positive (Figure 1).

In 1985, we began testing personnel in our Engineering Department. A strikingly similar pattern was revealed. In 1985, 12 percent of 125 Engineering Department personnel tested positive. In 1986, the num-

Figure 1. TRANSPORTATION DEPARTMENT
PERCENT TESTING POSITIVE

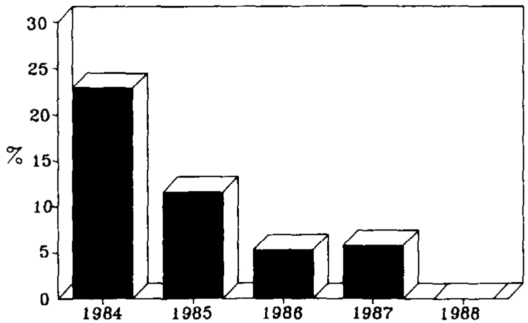


Figure 2. ENGINEERING DEPARTMENT
PERCENT TESTING POSITIVE

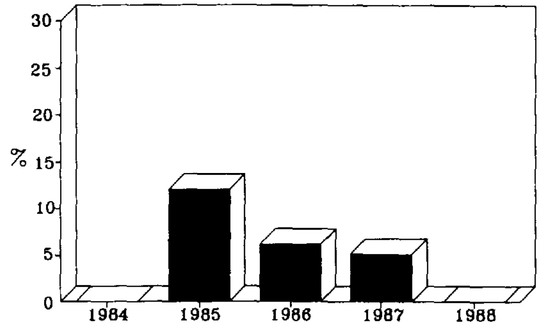


Figure 3. MECHANICAL PLANTS
PERCENT TESTING POSITIVE

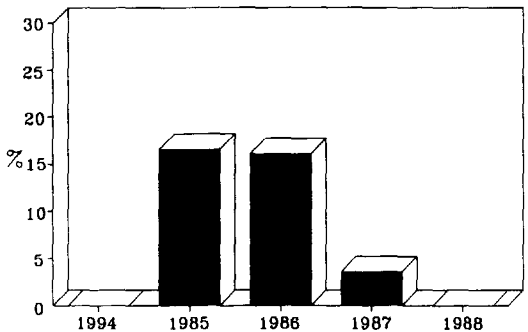
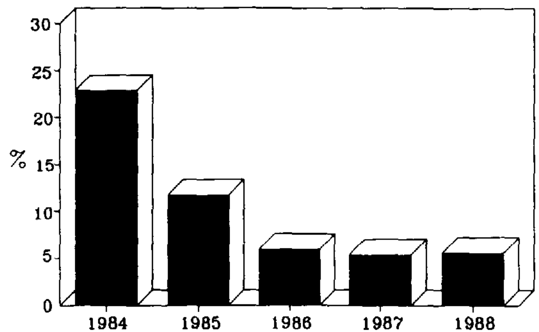


Figure 4. ALL EMPLOYEES
PERCENT TESTING POSITIVE



ber tested rose to 721 while the percentage of positives dropped to 6.2 percent. In 1987,680 tests were conducted with a 5.1 percent positive rate (Figure 2).

Later in 1985, we began testing personnel in our Mechanical Department. Twenty-four (24) tests were conducted with a 16.6 percent failure rate. In 1986,56 tests were conducted with a 16.1 percent failure rate. In 1987, the number tested increased three-fold to 168 while the failure rate dropped to 3.6 percent (Figure 3).

The percentage of positive tests shows a steady and dramatic decline from 1984 through June 30,1988 even though more than six times the number of people were tested in 1987 as in 1984 (Figure 4).

The decline in personal injuries since the initiation of urinalysis testing is equally dramatic and appears to be directly correlated to the number of tests performed. Figure 5 depicts personal injuries per 200,000 man

Figure 5. ALL EMPLOYEES
PERSONAL INJURY RATE vs. TESTS PERFORMED

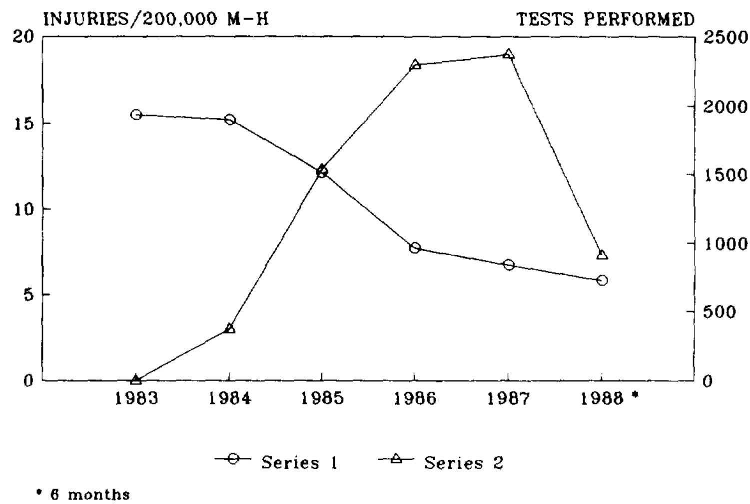


Table 1. Personal Injury Statistics

	Transportation 1983-1988	
	Total Incidents	% Change
1983	2,234	
1984	1,929	-14
1985	1,418	-26
1986	834	-41
1987	784	-6
1988*	322	

*For the first six months of 1988

hours worked from 1983, the last full calendar year prior to the initiation of testing, through the first 6 months of 1988. Personal injuries per 200,000 hours of man hours worked have dropped from 15.5 to 5.8 while the number of tests performed has risen from 0 to 2,372.

Personal injuries on the railroad have been dramatically reduced since the initiation of drug testing-from 2,234 in 1983 to 322 for the first 6 months of 1988 (Table 1).

Similarly, train accidents attributable to human failure have dropped from 911 in 1983 to 54 for the first 7 months of 1988. Stated another way, in 1983 there were 22.2 human factor tram accidents per 1 million train miles. During the first 7 months of 1988 there were 2.2 human factor train accidents per 1 million train miles (Table 2).

Table 3 shows the most commonly detected drugs since the initiation of our program.

In response to the argument that drug tests should be limited to individually observed work-related problems, it should be noted that less than 5 percent of the total tests we have administered were triggered by observation of physical symptoms or other accepted work performance standards.

Table 2. Human Factor Train Accidents

Transportation Department

Southern Pacific collects data on all human factor caused train accidents and uses this data in its accident prevention program.

	Incidents	Ratio*	% Change	Dollar Damage
1983	911	22.2	—	$6,439,677
1984	449	10.5	-50.7	$5,490,356
1985	295	8.1	-34.3	$4,076,133
1986	168	4.2	-43.1	$1,204,477
1987	135	3.2	-20.0	$3,119,822
1988**	54	2.2		$902,261

*Ratio stated in terms of 1,000,000 train miles
** For the first seven monthsr of 1988

Table 3. Most Commonly Detected Drugs

	Marijuana	Cocaine	Alcohol	Misc.
1984	53.8%	20%	12%	14.2%
1985	55%	17%	15%	13.0%
1986	33%	46%	15%	6.0%
1987	43%	12%	30%	15.0%
1988*	52%	20%	24%	4.0%

* For the first six months of 1988

Our program is far from perfect, but through open and continuing communications with labor leadership and a perceptively even-handed approach to testing, we have avoided union confrontation. We now have sufficient statistical data from which we can convincingly show in a court room that:

- Railroad operations clearly present a potential risk to public safety if not carried on in a safe manner.

- Drug use in the workplace is a reflection of drug use in our society. It is simply not true that a drug user or alcohol abuser leaves his habit at the factory gate or the office door.

- Drug testing does make the workplace safer and increases overall public safety by substantially reducing accidents and injuries.

- Drug testing does act as a powerful deterrent to drug use on the job

Random testing in the private sector may eventually be tolerated. However, it appears, at this point in time, to be tolerated only when applied to employees engaged in safety-related jobs. Testing must be directly tied to the safe operation of the entity in question.

The question immediately arises as to what is a safety-related job. Supervisors are certainly within the scope of coverage, but how far removed from direct hands-on operation they may be remains to be seen.

REHABILITATION

Employees who test positive for drugs or alcohol are given the opportunity to participate. in a drug rehabilitation program. We view drug use as a medical problem, and treat it as such. We hope rehabilitation will free them from drugs and return them to the job and their families as productive citizens. Our success rate with rehabilitation is most encouraging.

Under our rules, an employee is removed from service for the violation of Rule G, but may be considered for return to service on a conditional basis, providing the employee:

- Participates in and successfully completes a rehabilitation program as agreed to with the Employee Assistance Counselor

- Agrees to:

  - Return to work with seniority unimpaired but without compensation for time lost

  - Probation for at least 2 years, during which time the employee must abstain from any alcohol or drug use

  - Automatic dismissal from service if the terms of probation are violated

  - Submit to random, unannounced drug tests

At the end of 2 years, the Employee Assistance Counselor makes recommendations as to whether probation should be continued or terminated.

Our experience is that the earlier the detection, the better the chance for successful rehabilitation. Thirty-nine percent of our employees who have successfully completed a drug treatment program-most of which are in-patient programs-have tested positive within the 2-year probationary period. Ninety-two percent of these occur in the first year of probation. That is a disappointing statistic, but medical experts tell me that our numbers are pretty good.

IMPAIRMENT

A major question is whether or not "impairment" should be the criterion for whether an individual can be tested or disciplined for drug use. Urinalysis drug tests show whether or not there are drugs present in the system of the individual tested. They do not show impairment. An individual can drink an alcoholic beverage (or several alcoholic beverages) every night of his adult life, and because alcohol leaves the body within a relatively short time, he or she will never register positive on an employer-administered drug or alcohol test. However, the cumulative effects of excessive alcohol use may result in a steady decline in the employee's health, safety, and general well-being.

A marijuana smoker-even the occasional or social user—carries the chemical component of the drug to the workplace. The marijuana commonly used today is 5 to 10 times stronger than that commonly smoked in the 1960s. THC will be present in the body for as long as a week for the occasional smoker, and many weeks for a regular user. Occasional cocaine users can register positive on a drug test for up to 48 hours following ingestion.

One argument in opposition to urinalysis testing is that because drug tests do not show impairment, they are really a means by which an employer can spy on the off-duty, and private activities of employees. An employer has the right to insist that employees report for work with no illicit drugs in their bodies. There is more than sufficient justification for such a requirement.

An employer has the right to insist as a condition of employment—no drugs in the employee's system! Impairment need not and should not be the issue. By inference—if you accept the impairment criteria, you are indirectly accepting the use of drugs by your employees. If an employer can set work reporting times, vacations, dress codes, etc., he or she certainly can insist that the employee report for work free of drugs and drug residues.

There is ample reliable statistical data to prove that an employee who uses drugs:

- Is more likely to be involved in accidents
- Is more likely to be injured
- Will be absent more than twice as often as the non-user
- Will receive sickness benefits many times those of the non-user
- Will exhibit reduced productivity and quality
- Will be involved in substantially more grievance matters and file many more workers' compensation claims
- Is much more likely to steal to support a drug habit

The fact that other factors may cause some of these symptoms in no way detracts from their validity with respect to drug use.

CONCLUSIONS

We should not lose sight of the fact that the employer's supposed intrusion into the employee's off-duty activities involves conduct which our society today condemns as unacceptable and illegal, and which directly contributes to the most serious organized crime problem in the world today.

Business not only has the right, but perhaps even an obligation, to employ every reasonable means to provide a drug free workplace and to assist substance abusers in becoming productive members of the work force, while recognizing an obligation to give due respect to personal privacy. It is an extremely delicate issue, with no clear-cut answers. Our personal liberties are not absolute. They are conditioned on what is deemed to be in the best interests of a safe, moral, and healthy society, balanced against the degree of intrusion imposed by-in this case-drug testing.

The drug testing debate and attendant litigation continues to boil. One thing is clear. Public opinion and worker acceptance of on-the-job drug testing has shown a decided swing toward the acceptance of testing.

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Relationship of Drug Use to Performance and Productivity

An Empirical Evaluation of Preemployment Drug Testing in the United States Postal Service: Interim Report of Findings

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U.S. Postal Service

INTRODUCTION

The use of illicit drugs has been a matter of growing national concern. According to yearly assessments of American high school students and young adults, drug use increased steadily through the 1960s and 1970s, climaxed in the early 1980s, and has remained fairly stable ever since (Miller and Cisin, 1983; Johnston et al., 1987). The National Household Survey on Drug Abuse indicated that 19.3 percent of Americans over 12 years of age had used illicit drugs (e.g., marijuana, cocaine, PCP, hallucinogens) during the past year (NIDA, 1987). In the 18- to 25-year-old adult population, representing the young people now entering the American workforce, 42 percent had used illicit drugs in the past year, 25.5 percent in the past month. The most recent trends indicate that the general prevalence of drug use has now stabilized, although at levels many consider to be alarming (Dupont, 1986; Walsh and Yohay, 1987).

As a result of this national concern with drug abuse, greater emphasis has been placed on drug use among working adults. For example, Cook and Harrell(1987) analyzed self-report data from a national sample of 1,716 adults who were employed in jobs outside the home. Overall, 18 percent of the sample had used marijuana in the past year (11 percent in the past month) and 6 percent had used cocaine during the same period (2 percent in the past month). Marijuana and cocaine rates of use were greater among workers under 35 than among older workers and higher for males than females.

Although there is evidence of substantial drug use among working adults (Backer, 1987), little empirical information exists concerning the prevalence of drug use in the workplace. Most studies addressing this issue make reference to general prevalence of drug use and implicitly assume that this rate applies to drug use on the job (e.g., Cook and Harrell, 1987). This assumption, while intuitively appealing, is not sub stantiated by empirical evidence. An exception to this is a study reported by Newcomb (1988) of young adults (N = 739) reporting general substance use as well as substance use specifically at work or school. The general prevalence rate for marijuana was 42.8 percent in the past 6 months, compared to only a 16.6 percent rate of use at work. Cocaine was the next most frequently used illicit drug with a general prevalence rate of 33.8 percent versus a 9.3 rate of use during working hours. Other illicit drugs followed the same prevalence pattern. It was concluded that rates of general drug use and drug use at work parallel one another, but general prevalence rates are considerably higher in magnitude and cannot be used as a substitute for assessing prevalence patterns in the workplace.

The few existing estimates of the economic burden of drug use in the workplace report direct and indirect costs to employers and their employees that amount to several billion dollars a year. The figures have been on the rise for a number of years. For example, the Research Triangle Institute estimated that drug abuse cost the U.S. economy $46.9 billion in 1980. By 1983, the revised figure had risen to $57.9 billion, representing a 27 percent increase (Harwood et al., 1984). A more recent estimate by the Metropolitan Life Insurance Company put the direct costs to industry at $85 billion a year (as cited in Cohen, 1984). Included in these estimates are lost time, reduced productivity, lost employment, injuries, accidents, and crime (Backer, 1987). One difficulty in interpreting these figures noted by Harwood et al. is that the estimates can increase (or decrease) over time for reasons other than an increase (or decrease) in the true prevalence of drug use (e.g., inflation, population growth, sex and age distribution of targeted population). Crown and Ftosse (1988) also point out that most estimates of this type are highly speculative and are not specific enough to provide the kind of hard proof individual employers may need to claim job relatedness.

In response to employee drug use, an increasing number of employers have adopted drug testing and employee assistance programs (EAPs). Drug screening, usually in the form of urinalysis, has become common among Fortune 500 companies (Walsh and Hawks, 1988) and several government agencies (Gillette, 1986). The widespread use of drug testing programs has largely been due to technical developments in urinalysis methods and an increasing awareness of the potential safety and financial consequences of employee drug use (Schuster, 1986). Despite the enormous popularity of drug screening programs, a number of technical, practical, and legal concerns have surfaced regarding their role in reducing the negative impact of employee drug abuse (Dogoloff and Angarola, 1985; Rosen, 1987; Wrich, 1988). One criticism of particular concern is the lack of systematic evaluation of the efficacy of drug screening programs. The scientific base of information currently used to justify the implementation of these programs comes largely from controlled laboratory and self-report studies concerned with the effects of drug use on various measures of social, cognitive, and psychomotor functioning.

A number of studies relating to the performance effects of specific drugs have been conducted in controlled laboratory settings. For example, laboratory research has indicated that marijuana intoxication impairs attention, recall, and the psychomotor skills associated with operating a motor vehicle or flying a plane (Murray, 1986). One critical finding for industrial operations was that smoking marijuana produced measurable performance impairment on a battery of cognitive and psychomotor tests the morning after smoking marijuana (Chait et al., 1985). One study utilizing a highly sophisticated flight simulator showed subtle (through statistically significant) performance impairment in licensed pilots 24 hours after having smoked a single marijuana cigarette (Yesavage et al., 1985). The impairment persisted long after the subjective effects of the initial "high" had subsided. Despite the performance decrements, the pilots reported no awareness of their impairment.

A number of recent studies have investigated the relationship between self-report measures of drug use and various work-related variables. Newcomb (1988) used data from a group of employed young adults (N=468) to analyze the relationship between use of illicit drugs at work in the past 6 months and two job-related variables: job separation and vandalism at work. The illicit drug use categories were cannabis, cocaine, and hard drugs (a composite of stimulants, hypnotics, and cocaine). Product-moment correlations were calculated between each drug use measure and the two work-related measures. Cannabis use at work was significantly correlated with losing a job in the past 6 months (.20, $p < .001$) and vandalism at work (.12, $p < .01$). Cocaine use at work was not significantly correlated with job separation or vandalism at work. The use of hard drugs at work was not related to job separation but was significantly correlated with vandalism at work (.19, $p < .001$). The conclusion was that only certain types of drug use at work were related to job separation and vandalism.

McDaniel (this volume) used self-reports of preemployment drug use from 10,188 military applicants to predict unsuitability discharges from the military. The drug use items assessed the frequency with which applicants had used illicit drugs or prescription drugs without the permission of a medical doctor. The unsuitability measure was defined as a discharge from the military for behavioral or performance reasons such as discipline problems or dismissal from a training program. The product-moment correlations between frequency of drug use and employment suitability (a dichotomized variable) were extremely small: .07 for marijuana and .04 for cocaine. The validities for the other drugs included in the study were no better (e.g., .07 for stimulants, .05 for other narcotics). It was concluded that the low prevalence rates and reliabilities of most of the measures contributed to their low validities in predicting on-the-job suitability.

Kandel and Yamaguchi (1987) used a continuous-time exponential hazards model to analyze the time-varying relationships between monthly self-reports of drug use and job separations. The information gathered by the researchers covered a S-year period and was based on a sample of 1,325 young adults aged 24-25. Theresultsindicated that drug use predicts job turnover and decreased tenure on the job but that this finding could not be attributed entirely to the effects of the drugs themselves. A true drug effect would have resulted in the effect of current use (use within past month) being stronger than the effect of former use (no use in a period of 1 month or more). However, the researchers discovered that the effects of former use and current use of drugs were equally strong. The last time most former users had used drugs was close to 2 years. It was concluded that for individuals who use drugs, turnover could be due to characteristics (e.g., attitudes, predispositions, and life-styles) that have little or nothing to do with patterns of drug use. The point was made that future research aimed at understanding the relationship between turnover and drug use must take these life-style patterns into account.

Very few studies have investigated the relationship between preemployment urinalysis test results and job performance. Blank and Fenton (this volume) analyzed demographic and turnover data for 482 male Navy recruits who tested positive for marijuana at accession and a comparable group who tested negative during the same period. Though retained by the Navy, recruits who tested positive were warned, counseled and, in some cases, subjected to regular drug testing. If subsequent tests were positive for any illicit substance, the recruit was discharged from the military and sent home. It should be noted that all recruits were subject to occasional random testing (about three times a year).

Significant differences between the positive and negative groups were found for education, race, and scores on a qualifying exam. Positives graduated from high school at a lower rate, were disproportionately black, and scored significantly lower on the Armed Forces Qualification

Test compared to negatives. Turnover data revealed that 43 percent of the positives and 19 percent of the negatives had separated after a period of 2.5 years. This difference in turnover rates may be due in part to the fact that recruits who tested positive at accession stood a much greater chance of being discharged from the service because of the policy calling for the regular screening of this group for drugs. In fact, one-third of the discharges for the positive group were for reasons of "drug abuse," a determination more than likely based on the results of drug urinalysis. To the extent that this contamination was present, the turnover data will be limited in assessing the relationship between preemployment drug test results and turnover.

Surprisingly little research has been reported in the literature concerning the relationship between drug test results and job performance (Crown and Rosse, 1988). Consequently, the job relatedness of preemployment drug testing, at least in the form of criterion-related validity evidence, has yet to be examined.

Given the current popularity level of urinalysis drug testing programs among major employers, the amount of popular press coverage, the sensationalistic and speculative statements made by proponents and opponents, the substantial amount of legal attention being devoted to the issue, and the scarcity of scientific studies which have evaluated its potential merits, the need for empirical research is manifest. In an attempt to compensate for this lack of data-based knowledge, this study will systematically evaluate the relationship between drug test results and job performance indicators within an applied work setting. A second purpose of this study is to assess the effectiveness of preemployment drug test results in predicting two of these indicators of successful job performance: turnover and absenteeism.

This report is the first in a series of interim reports. This report is limited to examining the relationship between drug test results and two job performance indicators, based on data from employees who had been on the job for an average of 8.2 months. Future interim reports will explore the relationships between drug test results and other outcome measures (e.g., accidents, injuries, benefit claims).

METHODOLOGY

Subjects

All applicants who applied for a permanent position with the Postal Service and had their preemployment medical examination performed by a U.S. Postal Service Medical Officer in one of 21 sites across the country submitted a urine sample at the time of medical examination. Five main selection criteria were used to identify the participating sites. First, employment sites with a formal preemployment drug testing program in place were excluded. Second, only sites with computerized personnel data bases were considered. This prerequisite was imposed to enable accurate monitoring of the participants' Postal Service careers via existing computerized records, without requiring any local monitoring. Employment sites with relatively high projected hiring activities were considered for participation in an attempt to obtain a sufficiently large sample size. In order to ensure a demographically heterogeneous sample of applicants, diverse geographic locations were selected. All participating sites had to have a Postal Service Medical Officer perform the medical examinations in the context of which the urine samples would be collected. Although all selected sites had computerized records, some of the applicants who were having the medical examination performed in those sites were assigned to working sites without such computerized systems. This logistical constraint prevented the retrieval of certain types of information (e.g., absenteeism records) on those employees. Of those sites which met these selection criteria, six were located on the east coast, eight were in the central part of the country, and seven were on the west coast. A complete list of these sites is presented in Table 1.

Drug test results were obtained from 5,465 job applicants. Urine specimens were collected between September 14, 1987 and May 27, 1988. A total of 4,375 of these job applicants were eventually hired and made up the study sample. This hiring rate resulted from preemployment screening in determining whether or not a job applicant is fit for duty. Suitability for employment is based in part on various preemployment evaluation procedures, including a review of previous work rec-

Table 1. Participating Sites

West	Central	East
Seattle, WA (2 sites)	Milwaukee, WI	Hartford, CT
Oakland, CA	River Grove, IL	New Haven, CT
Los Angeles, CA	Chicago, IL	Trenton, NJ
Long Beach, CA	Detroit, MI	Atlanta, GA
Santa Ana, CA	St. Louis, MO	Orlando, FL
San Diego, CA	Dallas, TX	Tampa, FL
	Fort Worth, TX	
	Denver, CO	

ords, criminal records, as well as a medical evaluation performed by a licensed physician.

The demographic characteristics of the sample as well as the national population of new hires for the same hiring period are given in Table 2. Breakdowns are provided for sex, age, and ethnicity. The subjects in the study group did not markedly differ from the U.S. Postal Service population of new hires. The only differences were that the sample had a greater percentage of blacks and a slightly lower proportion of new hires over the age of 40 than the national population. These differences resulted mainly from the inclusion of sites which were selected in order to satisfy the study criteria; these sites were concentrated in large urban areas.

It should be noted that permanent employment with the Postal Service is contingent upon successfully completing a 90-day probationary period. The probationary period results in a decision to retain or separate the appointee based on performance during this evaluation period. For this reason, the probationary period represents a rather atypical phase of a new employee's Postal career. For example, employees are encour-

Table 2. Demographic Characteristics of New Hires

	Sample		Population	
	No. of hires	Percent of Sample	No. of hires	Percent of Population
Sex				
Male	2535	60.1	41,134	59.1
Female	1684	39.9	28,497	40.9
Missing	1		32	
Ethnicity				
White	2097	49.8	46,678	67.2
Black	1370	32.5	13,476	19.4
Other	746	17.7	9,285	13.4
Missing	7		224	
Age				
Less than 25 yrs.	957	22.7	13,353	19.2
26 to 30 yrs.	1037	24.6	15,971	22.9
31 to 35 yrs.	848	20.1	14,297	20.5
36 to 40 yrs	667	15.8	11,347	16.3
41 and older	711	16.8	14,695	21.1
Missing	0		0	

aged not to use any leave and are generally expected to be on their best behavior. When these analyses were performed, 155 active employees had not completed their probationary periods. The results which follow were based on those employees who had the opportunity to complete this critical stage of employment (i.e, 4,220 of the total sample).

Procedure

Standardized collection procedures were established to ensure the accuracy and integrity of the data recorded in all sites. Participating physicians and Human Resources representatives from each site attended l-day briefing sessions prior to initiating the study. During these meetings, each attendee was given a detailed documentation package describing the study's methodology and data collection protocol.

During the course of the briefing, physicians were informed that they would not have access to the drug test results nor would the results be communicated to those making employment decisions or to any other local personnel. In order to ensure the objectivity of the study's results and the privacy of the individuals involved, the individual drug test results were made available only to the research team at Postal Service Headquarters. Not releasing these drug test results to any Postal Service personnel guaranteed that no future personnel action was influenced by the test results. This critical design feature was described in writing in the documentation package. It was also communicated in a letter to the Human Resources directors of all participating sites. In order to further protect the confidentiality of study participants, a Confidentiality Certificate issued by the National Institute on Drug Abuse (NIDA), under the authority vested in the Secretary of Health and Human Services, was obtained. This certificate legally protects the privacy of research subjects from any private or governmental access. In the orientation, physicians were reminded to follow normal medical protocol when determining whether or not an applicant was fit for duty, including drug tests if they would have normally requested such a diagnostic test. It was clearly communicated to them that they should not, as a result of the study, deviate from their normal protocol when performing their medical examinations.

Although no individual personnel action was taken as a result of the drug test results, it was still deemed essential that proper control mechanisms (i.e., chain ofcustody and standard collection protocol) be followed to ensure the accuracy of the data recorded. Chain of custody forms, urine collection bottles, and detailed chain of custody instructions were supplied by the contract toxicology laboratory. The Headquarters research team provided each site with a detailed step-by-step collection protocol instruction sheet and a urinalysis implementation VHS video. Since all sites were already collecting a urine specimen from all job participants as part of the standard medical procedure for the preemployment physical examination, physicians were informed that immediately after having collected the specimen, a sufficient quantity of urine (i.e., approximately 50 ml) should be transferred to the laboratory's collection bottle prior to performing the standard multitest stick for albumin, sugar, and blood.

In addition to collecting urine specimens, physicians were required to complete a personal history form (PHF) for all job applicants. The information collected on the PHF consisted of demographic information (e.g., name, sex, age) and personal history data (e.g., smoking habits, exercise habits, use of medication). Physicians were informed both verbally during the briefing sessions, and in writing (i.e., collection protocol documentation package), to investigate thoroughly the applicant's prior use of medication when completing the "current medication used" section of the PHF. This latter information regarding the use of over-the-counter drugs or use of prescription medicine was used to identify justified true positives (i.e., those whose positive test results could have been caused by the legitimate use of medication) and to properly code their drug test results for the analysis. Assistance from toxicologists at NIDA was obtained to ensure that all justified true positives were accurately identified. The drug test results for these participants were coded as negative only for individual drug test results that were due to the legitimate use of prescribed or over-the-counter medication.

In addition to informing participants in writing (i.e., the standard U.S. Postal medical assessment form) that a urine sample would be collected and that part of that specimen would be used for a drug test, physicians were provided with standard language to verbally inform subjects of their participation in a drug study. The PHF, which was partially completed by the job applicants, also informed them of the purpose of the data collection and how the data would be used.

Finally, as an added feature, 5 of the 21 sites (Trenton, NJ; Tampa, FL; Chicago, IL; Fort Worth, TX; and San Diego, CA) were used as quality control sites. In order to evaluate the reliability and accuracy of the contract toxicology laboratory, 250 quality control urine samples were submitted "blind" (i.e., without the laboratory's knowledge) via the above-mentioned sites. Fifty blank (i.e., drug-free) samples, 100 samples containing cross-reactive agents, 50 samples spiked with drug metabolites at concentration levels just below the cutoff levels, and 50 spiked samples with drug metabolites at concentration levels which exceeded the cutoff levels were purchased. Each of the five participating sites was given detailed instructions to ensure that these quality control samples would be submitted blind to the contract toxicology laboratory.

Measures

Under chain of custody procedures, urine samples were sent from the study sites to the contract laboratory for analysis. Urine samples were initially screened using the Enzyme Multiplied Immunoassay Technique (EMIT). All specimens identified as positive at the initial screening were confirmed using the Gas Chromatography/Mass Spectrometry (CC/MS) technique. Quantitative CC/MS readings were reported for all specimens identified as positive at the initial screening, regardless of the concentration level detected at confirmation. All specimens were tested for eight drug types at predetermined levels of sensitivity. Table 3 provides a list of the individual drug types as well as their associated drug metabolites and the required cutoff levels for positive screening test results using EMIT. It should be noted that two marijuana screenings were performed at the preliminary stage. The first screening used a cutoff level of 20 ng/ml for marijuana metabolites. Specimens identified as positive at that preliminary stage were then confirmed using the GC/MS technique and were also submitted to a second screening using an EMIT cutoff level of 100 ng/ml. The use of two EMIT cutoff levels for marijuana at the initial screening phase was incorporated into this study design to allow the further exploration of the impact of the Health and Human Services'recommended 100 ng/ml EMIT cutoff level.

Four different independent drug test variables were used for this study. The first variable (i.e., Overall Test) was defined as positive if the urine specimen was found to contain one or more of the drug and/or metabolites of the eight parent drugs at predetermined concentration levels using CC/MS. The confirmation GC/MS cutoff levels used to define a test result as positive in this study are shown in Table 4. Specimens that were found to contain none of the drugs and/or metabolites at the confirmation stage were defined as negative. This operational definition mimics the definition used by most organizations that have implemented a urinalysis drug testing program as well as the U.S. Postal Service's drug testing program. No distinction is made with regard to individual drug types. A specimen is either positive or negative for drugs.

In order to assess the impact of individual drugs, three additional independent variables were used. The variable "marijuana" was defined

Table 3. Drugs and Cutoff Levels

Drug Type	Drug and/or Metabolite*	EMIT Screening Cutoff level
Amphetamine	Amphetamine Methamphetamine	1000 ng/ml
Barbiturate	Amobarbital Butabarbital Pentobarbital Phenobarbital Secobarbital	300 ng/ml
Benzodiazepine	N-Desmethyldiazepam Nordiazepam Oxazepam	300 ng/ml
Cannabinoid	THC-COOH THC-COOH	20 ng/ml 100 ng/ml
Cocaine	Benzoylecgonine	300 ng/ml
Methadone	Methadone	300 ng/ml
Opiate	Codeine Morphine	300 ng/ml
Phencyclidine	Phencyclidine	25 ng/ml

*Metabolite refers to the biological breakdown product of the parent drug (e.g., THC-COOH and benzoylecgonine am the common metabolites of marijuana and cocaine, respectively).

as positive only if a urine specimen was confirmed to contain THC metabolite (THC-COOH) and no other drug metabolites, and as negative if no drug metabolites were confirmed to be present in the urine sample. The "cocaine" measure was defined as positive if only benzoylecgonine (a cocaine metabolite) or THC-COOH and benzoylecgonine were found at concentrations equal to or exceeding the CC/MS cutoff levels. This cocaine measure was defined as negative if no drug metabolites were confirmed by CC/MS. The rationale used to define cocaine as positive if it contained THC-COOH as well as benzoylecgonine was that since cocaine is a more addictive drug which metabolizes more rapidly than marijuana, it was most important to consider the results as effects of cocaine on the outcome measures even when present with a milder drug. Finally, the measure "other" was defined as positive if the specimen contained confirmed levels of one or more of the remaining

Table 4. GC/MS Confirmation Cutoff Levels

Drug Type	Drug and/or Metabolite	GC/MS Confirmation Cutoff level
Amphetamine	Amphetamine Methamphetamine	300 ng/ml
Barbiturate	Amobarbital Butabarbital Pentobarbital Phenobarbital Secobarbital	300 ng/ml
Benzodiazepine	N-Desmethyldiazepam Nordiazepam Oxazepam	300 ng/ml
Cannabinoid	THC-COOH	20 ng/ml
Cocaine	Benzoylecgonine	150 ng/ml
Methadone	Methadone	300 ng/ml
Opiate	Codeine Morphine	300 ng/ml
Phencyclidine	Phencyclidine	25 ng/ml

drugs, or combinations of any of the drugs except for the "marijuana/ cocaine" combination. If the specimen was confirmed to be drug-free, the "other" variable was said to be negative.

Two outcome measures were used in this interim phase of the longitudinal study.

- **Absenteeism**—The first measure to be investigated was absenteeism. For the purpose of this study, absenteeism was defined as being a function of three different types of leave: sick leave, leave without pay (LWOP), and absent without official leave (AWOL). This definition automatically excludes annual leave, administrative leave, and the like. The total hours of leave taken under these three types of job absence were used to compute an absenteeism index for each employee participating in the study. An absenteeism rate was computed for each employee using the following equation:

$$\text{Absence rate} = \frac{\text{Sum of (SICK+LWOP+AWOL) hours}}{\text{Sum of (SICK+LWOP+AWOL+WORKED) hours}}$$

- **Turnover**—Individuals whose employment with the Postal Service was terminated, regardless of reason, were defined as having turned over. All remaining study participants who had not experienced any break in service and were still active employees were said to have not turned over. In addition to overall turnover, more refined analyses were carried out by separation type. To do so, turnover was broken down into voluntary and involuntary separations (Muchinsky, 1987). The turnover was said to he voluntary if an individual's employment was terminated as a result of a resignation or transfer to another government agency. Turnover was defined as involuntary if the Postal Service initiated the employment termination (i.e., the employee was fired).

Analyses

As stated earlier, the purpose of this study was twofold. The first intention was to determine if drug test results and outcome measures are related, and if so, to describe their degree of association. A second intention was to determine the effectiveness of preemployment drug test results in predicting turnover and absenteeism as indicators of successful job performance.

First, basic descriptive statistics for all pertinent variables were obtained. Based on a review of the absenteeism descriptive statistics (Table 5), the non-Gaussian distribution of the absenteeism index and the severe degree of skewness of that distribution made it obvious that traditional parametric measures of association and their respective statistical tests could not be performed on the continuous absenteeism measure.

Table 5. Absenteeism Descriptive Statistics

N	2,895	STD DEV	0.084
Mean	0.031	Skewness	6.015
Mode	0.000	Kurtosis	44.984
Median	0.007	Range	0.931

However, since this study was not limited to investigating measures of association between two variables, and since differences in mean absence rates between the positive and negative groups would be highly informative, the disparity in mean absence rates was investigated. Given the central-limit theorem and the robustness of the t-test (Holden and Overall, 1987), the difference in group means was assessed via a t-test.

One alternative to the association issue which was investigated and would have minimized the loss of information contained in the continuous measure, was the use of nonparametric statistics based on ordinal measurement. However, a disproportionately large number of tied ranks would have resulted because 37.9 percent of the participants had not used any leave at the time these analyses were performed; therefore, such a procedure could have severely biased the results since an excessive number of tied ranks would be concentrated at one end of the distribution. The appropriate alternative, in this case, was to partition the absenteeism distribution into approximately equally-populated class intervals and perform the statistical analyses on the discrete categories.

In partitioning the absence rate distribution, various considerations were taken into account. First, categories had to be identified in such a way as to have approximately equally-populated class intervals. This identification was necessary in order to minimize the loss of power to detect differences Williams, 1950). Second, the partitioning had to result in meaningful absenteeism categories to facilitate the interpretation of the results. The first of these categories included all study participants who had not taken leave. Given the large number of subjects with such a leave record, a further breakdown of this category was not possible. In order to identify the next break point in the job absence rate distribution, the two previously mentioned considerations of equally-populated class intervals and meaningfulness were taken into account. The Postal Service's targeted annual sick leave rate has been around 3.0 percent during the last few years. The annual sick leave rate for 1987 was 3.1 percent. Further, this figure is very close to the 1987 median absence rate of 2.5 percent reported by the Bureau of National Affairs (BNA, 1988) for service and governmental organizations. Therefore, the use of a 3.0-percent absence rate as a break point was selected. The use of such a break point resulted in approximately equally-populated class intervals: 37.9 percent in the "none" (i.e., 0 percent) category, 39.7 percent in the "moderate" (0 to 3 percent) category, and 22.4 percent in the "heavy" (above 3 percent) category.

The chi-square test of independence was used in this study to assess the significance of the association between drug test results and the two outcome measures of job absence and turnover. For the purpose of this study, both the odds ratio and Yule's Q were adopted to reflect the strength of the association when a chi-square test revealed the presence of a significant association. The odds ratio ranges from zero to infinity, with 1.0 indicating statistical independence. Values less than 1.0 imply a negative association, while values greater than 1.0 indicate a positive relationship. Yule's Q is a function of the odds ratio and consequently shares its strengths. The values of this measure of association range from -1 to +1, with 0 implying statistical independence.

In order to investigate whether or not individual drug test results are a viable predictor of successful job performance in terms of turnover or absenteeism, a predictive model has to be specified. Since one of the stated purposes of the study was that of prediction, the linear regression model would appear to be the appropriate statistical procedure given the nature of the investigative problem. However, given the noncontinuous nature of the outcome measures, the use of such a procedure would lead to biased parameter estimates and invalid significance tests.

As a result of having discrete dependent variables and consequently not meeting the underlying assumptions of the linear regression model, the logistic regression model was adopted for investigating the predictive efficiency of individual drug test results.

One last issue which had to be resolved was to determine what variables should be included in the logistic regression model. To answer that question, each potential variable has to be evaluated in terms of its theoretical merit, preferably based on previous research findings. As far as absenteeism is concerned, family responsibility has been shown to have a constraining effect on job attendance (Steers and Rhodes, 1979). These constraints, as they relate to attendance, are largely determined by the personal characteristics of the individual (e.g., sex and age). In general, women as a group are absent more frequently than men (Hedges, 1973; Flanagan et al., 1974). Available evidence suggests that the absenteeism rate declines throughout women's careers and increases with age for males (Nicholson et al., 1977). Since age and sex appear to influence absenteeism patterns, these two variables were included in this study's absenteeism predictive model.

Previous U.S. Postal Service research efforts have revealed (U.S. Postal Service, 1987) that the nature of a new employee's position plays a significant role in explaining the Postal Service's turnover experience. In view of these findings, it was determined that the job category for which a new employee is hired should be included in this study's predictive turnover model. Most new Postal Service appointments can be grouped under one of three major job categories. These main entry positions are: distribution clerks, carriers, and mail handlers. For the purpose of this investigation, the occupational groups of all new hires were classified as follows: distribution clerks, carriers, mail handlers, and miscellaneous.

It should be mentioned at this point that the main concern of this study is prediction, not explanation. Therefore, the inclusion of these additional variables in the drug test predictive models should be viewed in that light. They are included in the models to provide more efficient tests of significance for the coefficient associated with drug test results. This investigation is not concerned with the magnitude of the individual effect size of the independent variables relative to one another. The main question of interest is whether or not drug test results are a viable predictor of the two outcome measures being investigated: turnover and absenteeism. The predictive ability of the models were assessed using the SAS Logist procedure program (Harrell, 1986).

RESULTS

This section summarizes interim findings regarding the prevalence rate of positive drug test results and data relating to the strength of the relationships between drug test results and absenteeism as well as drug test results and turnover.

Prevalence Rates

Table 6 shows that 9.4 percent of all eligible job applicants (i.e., eligible on the basis of a written test or an evaluation of training and experience) tested positive for drugs at the time of their medical examinations. Sixty-three percent of these were found to be positive for marijuana, 25 percent were positive for cocaine, and 11 percent were positive for other drugs.

The positive rates for new career hires were slightly lower than those of eligible applicants. The overall positive rate of new hires was 8.4 percent, with 65 percent of the positives testing positive for marijuana, 25 percent for cocaine, and 9.6 percent for other drugs. Given the extremely low prevalence rate of the “other” variable (i.e., 0.9 percent), no further analysis was performed for this variable. The data presented in Table 6 also reveal that 31 percent of the eligible applicants who tested positive were not hired compared to 22 percent of those who tested negative for drugs. These rates suggest that those eligible applicants

Table 6. Prevalence Rates of Applicants and New Hires

		Applicants	New Hires
Overall Test	Positive	515 (9.4%)	354 (8.4%)
	Negative	4950 (90.6%)	3866 (91.6%)
Marijuana	Positive	327 (6.2%)	232 (5.7%)
	Negative	4950 (93.8%)	3866 (94.3%)
Cocaine	Positive	130 (2.6%)	88 (2.2%)
	Negative	4950 (97.4%)	3866 (97.8%)
Other	Positive	58 (1.2%)	34 (0.9%)
	Negative	4950 (98.8%)	3866 (99.1%)

who tested positive were screened out either during the employment suitability process (i.e., the medical and the final phases of the personal check of suitability) or refused appointments at a higher rate than those who tested negative.

As reported in previous research (e.g., Cook and Harrell, 1987; Blank and Fenton, this volume; Newcomb, 1988), an analysis of prevalence rates by race, sex, and age group revealed that the odds of being positive are higher for blacks, males, and people between the ages of 25 and 35. One finding worth noting is that the positive rate of blacks was twice that of whites (14.0 percent vs 6.5 percent respectively). Moreover, with regard to individual drug test results, blacks were more than six times as likely to test positive for cocaine than whites, and almost twice as likely to test positive for marijuana. In addition, although males were found to be approximately 1.5 times more likely to test positive for marijuana than females, no such difference was observed for cocaine. Both males and females tested positive at approximately the same rate for cocaine (i.e., males 2.25 percent vs. females 2.19 percent).

Absenteeism

The mean absence rate of 4.35 percent for those employees who tested positive for drugs was found to be significantly different from 3.0 percent for the negative group. The t statistic ($t = -2.06$, $df = 306.9$, $p = 0.04$) was computed under the assumption of unequal variances using Satterth-Waite's formula (SAS, 1985) for approximation of the degrees of freedom. Furthermore, Table 7 shows that employees who tested positive are more than 1.75 times as likely to take leave as those who tested negative. When these analyses are carried out separately for individual drug types, an enlightening pattern emerges. Table 8 reveals that marijuana users are twice as likely to take a moderate amount of leave than members of the drug-free group. Whereas, as depicted by Table 9, employees who tested positive for cocaine are more than three times as likely to be heavy leave users compared to the employees who tested negative. The chi-square tests and the respective measures of association on which these differences are based are provided in Table 10.

Table 7. Absenteeism by Overall Test

	Test	
Absence	Negative	Positive
None	1026 (39.12%)	72 (26.47%)
Moderate	1027 (39.15%)	122 (44.85%)
Heavy	570 (21.73%)	78 (28.68%)

Table 8. Absenteeism by Marijuana

	Marijuana	
Absence	Negative	Positive
None	1026 (39.12%)	(26.16%)
Moderate	1027 (39.15%)	(51.74%)
Heavy	570 (21.73%)	38 (22.09%)

Table 9. Absenteeism by Cocaine

Absence	Cocaine Negative	Cocaine Positive
None	1026 (39.12%)	(24.32%)
Moderate	1027 (39.15%)	(32.43%)
Heavy	570 (21.73%)	32 (43.24%)

Table 10. Significance Test and Measures of Association

Variables Studied	Chi-Square Value	df	Prob.	Odds Ratio	Yule's Q*	Yule's Q**
Overall Test	17.72	2	0.001	1.78	0.28	0.26
Marijuana	13.49	2	0.001	1.81	0.29	0.33
Cocaine	19.82	2	0.001	2.00	0.33	0.52

These measures of association reflect the relationships between drug test results and absenteeism rates based on specific 2 x 2 tables within the overall 2 x 3 contingency tables.
* Reflects the relationship based on the None leave category and the Moderate and Heavy categories combined.
** For Test and Marijuana these relationships are based on the None leave category and the Moderate leave category. Whereas, for Cocaine, it reflects the relationship based on the None leave category and the Heavy leave category.

Given the ordinal nature of the three absence categories, an ordinal logistic regression model was used to test the significance of the model and its individual parameter estimates. The solution of the ordinal logistic regression analysis, presented in Table 11, reveals that the postulated absence model is viable. Furthermore, it also reveals that Overall Test is significant in the prediction model, indicating that drug test results contribute in a statistically significant way to the prediction of employee job absence.

Table 11. Absence Logistic Regression Model

Variable	Regression Coefficient	Chi-square Value	DF	Probability
Overall Model		84.70	3	0.000
Alpha1	0.6891	13.07	1	0.001
Alpha2	-1.0873	32.23	1	0.001
Test	0.4877	17.21	1	0.001
Age	-0.0233	28.96	1	0.001
Sex	0.3675	25.77	1	0.001

Somer's D = 0.17 Goodman-Kruskal Gamma = 0.17

Turnover

The results of the chi-square test of independence for test results revealed no significant relationship between drug test results and overall turnover ($x^2 = 0.199$, df= 1, $p > 0.05$). Table 12 shows that both groups (i.e., positive and negative) have almost identical turnover rates (22.8 percent vs. 21.8 percent respectively).

Table 12. Turnover by Test Results

	Test	
Turnover	Negative	Positive
No	3021 (78.2%)	273 (77.2%)
Yes	845 (21.8%)	81 (22.8%)

Table 13 and 14 show that when separate analyses are performed for voluntary (Table 13) and involuntary separations (Table 14) (Muchinsky, 1987), a significant association is detected between the test and involuntary turnover ($x^2 = 4.627$, df= 1, $p = 0.03$). The odds ratio reveals that the odds of being involuntarily separated for applicants testing positive are approximately 1.5 times those of applicants testing negative. The degree of this relationship is reflected by Yule's Q, which was found to be 0.19. Another way of expressing this disparity is that employees who tested positive had a 40 percent higher rate of involuntary separation than those who tested negative.

Table 13. Voluntary Separation by Drug Test Results

	Test	
Turnover	Negative	Positive
No	3021 (85.2%)	273 (87.5%)
Yes	526 (14.8%)	39 (12.5%)

Furthermore, separate analyses by drug type of the involuntary separation data reveals that the strength of the association is stronger for cocaine (Q = 0.29, x^2 = 3.81, df = 1, p = 0.05) than any other individual drug. Applicants who tested positive for cocaine are almost twice as likely to be involuntarily separated than those who tested negative. Although the voluntary separation analysis did not reveal any significant difference in turnover rates between the negative and positive groups, it is worth noting that those employees who tested negative resigned at a higher rate than those who tested positive. This finding would partially explain why the overall turnover analysis did not detect any significant association. The involuntary separation results would appear to have been confounded by the type of separation (i.e., voluntary vs. involuntary) in the overall turnover analysis.

Table 14. Involuntary Separation by Drug Test Results

	Test	
Turnover	Negative	Positive
No	3021 (90.5%)	273 (86.7%)
Yes	319 (9.5%)	42 (13.3%)

Table 15 provides the results of the logistic regression model used to determine whether or not Overall Test was a viable contributor to the prediction of the probability of involuntarily separation. The results indicate ($x^2 = 80.15$, df = 4, $p < 0.001$) that the proposed model is a viable model for predicting the probability that an employee will be involuntarily separated. Furthermore, the results show that Overall Test is significant in the prediction model, which indicates that drug test results contribute in a statistically significant way to the prediction of employee involuntary separations.

Table 15. Involuntary Separation Logistic Regression Model

Variable	Regression Coefficient	Chi-Square Value	DF	Probability
Overall Model		80.15	4	0.001
Intercept	-3.3151	177.72	1	0.001
Test	0.4912	7.52	1	0.006
Job Category	0.8599	10.10	1	0.001
Carriers	1.4484	31.71	1	0.001
Mail Handlers	0.1252	0.13	1	0.721

Somer's D = 0.26 Goodman-Kruskal Gamma = 0.38

DISCUSSION

The present study examined various aspects of drug testing in an applied work setting. First, information was developed on the prevalence rates of eligible job applicants and new hires as well as prevalence rates of various demographic groups. In addition, data on the type and degree of association between drug test results and two job performance indicators (i.e., turnover and absenteeism) were presented, as well as information relating to the predictive ability of drug test results.

Prevalence Rates

The observed prevalence rate of new hires (i.e., 8.4 percent) was somewhat lower than what previous surveys of working adults (e.g., Cook and Harrell, 1987) would have led us to anticipate. However, this relatively lower prevalence rate could be attributed in part to this study's operational definition of drug use and to the components of the Postal Service's selection process, which, in this study, preceded the drug test. The study's prevalence rate was based on urinalysis drug test results, whereas most available prevalence rates reported in the literature are based on self-report survey data. In light of this critical difference in definition (i.e., testing positive vs. self-report of previous use of a drug), and the nature of the sample studied (i.e., prospective new hires vs. employed adults), it is understandable that this study observed a lower rate of drug use.

Furthermore, the results of this study revealed that eligible job applicants who test positive (i.e., those who survived the first selection hurdle) are less likely to be hired than those who test negative. Here again, the nature of the remaining selection components all eligible applicants must pass may partially explain the higher disqualification rate among positive applicants. The first of these remaining selection hurdles is a personal suitability check. This check is basically a review of previous work records and past criminal records. The last selection component consists of a fitness for duty medical examination.

The nature of these last selection components and the conclusions reached by other researchers (e.g., Stein et al., 1988; Kandel andYamaguchi, 1987)—that drug involvement and resulting adverse consequences are facets of a lifestyle reflecting other possible deviant attitudes and behaviors besides drug use-point to the following interpretation: job applicants who tested positive for drugs probably exhibited some other lifestyle characteristics which disqualified them at a higher rate than those who tested negative. Also noteworthy from this study's results is that not only are positive eligible job applicants disqualified at a higher rate than negative eligible job applicants (i.e., 32 percent vs. 22 percent), but the rate of disqualification varies by drug type, with a higher rate of disqualification among users of harder drugs. The disqualification rate was 29 percent for marijuana users, 32 percent for cocaine users, and 41 percent for others (which include polydrug users).

The patterns of drug use for various demographic groups reported in this study are similar to those reported by other researchers: (1) males have a higher drug use rate than females (e.g., Johnston et al., 1987; Cook and Harrell, 1987); (2) blacks' drug use rates are higher than whites' (e.g., Blank and Fenton, this volume; Newcomb, 1988); and (3) workers under 35 years of age have higher rates than older workers (e.g., Cook and Harrell, 1987). It is therefore not unexpected to see these demographic patterns reflected in urinalysis drug test results. However, it is surprising that the difference in positive rates observed for males and females for overall drugs and marijuana vanishes with cocaine, but triples for blacks compared to whites for the same drug. This finding may be related to the increase in popularity and availability of cocaine in recent years among females and minorities (Washton and Cold, 1987).

When comparing these prevalence rates to other research findings, especially self-report studies, it is important to keep this point in mind: the consequences associated with reporting, for research purposes, for illicit drug use in the last few months are not as severe as the consequences of testing positive for drugs when applying for a permanent position with an organization. Therefore, given the context in which this study was performed, it is understandable that the pattern of use was replicated in this study, but the magnitude of the prevalence rates were lower.

Drug Test Results: Relationship to Job Performance Indicators

Drug test results were found to be significantly associated with both involuntary separation (turnover) and job absence. The degree of those associations varied from 0.19 to 0.29 for involuntary separation and from 0.26 to 0.52 for absence. For both of these outcome measures, the association was found to be strongest for cocaine. In addition, drug test results were also shown to contribute significantly to the prediction of involuntary turnover and absenteeism as measures of job performance.

The magnitude of the relationships might be underestimated because drug test results are subject to systematic error. Of concern here is systematic error of measurement (i.e., measurement validity). With regard to the drug test measures, according to the quality control study which was an integral part of this research project, the only errors observed were due to false negatives (American BioTest Laboratories Inc., 1988). More specifically, the laboratory results yielded zero false positives for the blank specimens, zero false positives for the known cross-reactants, one false negative for phenobarbital, two false negatives for morphine, and one false negative for marijuana. Based on these results, it is clear that the source of misclassification is in the direction of false negatives. The impact of such errors would he underestimations of the true relationships between the drug test results and the job performance indicators.

A number of other statistical artifacts may contribute to the underestimation of the relationships. Data comparing the prevalence rates of eligible job applicants with those of new hires reveals that a sizable number of positive applicants are not hired. A number of applicants, when informed that their urine specimens would be screened for drugs as part of a research study, withdrew from the employment process, presumably in anticipation of testing positive. The restriction in range due to this deterrence effect and the differential hiring rates of positives and negatives resulted in exclusion of a substantial number of drugusers from the study. To the extent of such exclusion, the effect would be an underestimation of the relationships between the variables under study. In addition, the observed difference in absenteeism rates between the positive and negative groups (i.e., 1.3 percent) is probably an underestimate of the real difference in absence rates in the population given the tenure of study participants. Leave abusers who were on their best behavior during probation and early employment are anticipated to eventually revert to their more characteristic modes of behavior. This reversion will more than likely produce greater differences in absenteeism between the two groups as their careers progress. Finally, the low prevalence rate of new hires and the low base rate of the outcome measures contribute to the conservative estimates of the relationships.

The meaningfulness of a statistically valid predictor such as drug test results may be assessed in light of the type of employment errors resulting from such a model. Concerning prediction error, the GUMS confirmation test, when performed by a competent laboratory, has an essentially zero false positive rate, as was reflected by this study's quality control evaluation results. Therefore, a highly controversial type of employment error—e.g., an applicant who erroneously obtains a positive test result and would have performed satisfactorily if hired-is extremely unlikely. Consequently, the question is not whether an applicant has used an illicit drug, but rather, will information on whether an individual has recently used an illicit drug reduce employment error? This question is answered by the results which show that drug test results are a significant contributor to prediction of turnover and absenteeism as indicators of successful job performance.

Finally, the relatively low observed prevalence rate, as well as the observed false negative rate, are a direct consequence of the currently used cutoff levels. Any reduction in the cutoff levels, assuming equal measurement accuracy, would increase the prevalence rate and consequently, as stated above, affect the magnitude of the observed relationships upward. It would also increase the predictive ability of drug test results. The impact of using a 20 ng/ml cutoff level for the EMIT screening test rather than NIDA's recommended 100 ng/ml is currently being investigated. To do so, differences in behavioral patterns (as far as turnover and absenteeism are concerned) are being studied.

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Early Employment Testing for Marijuana: Demographic and Employee Retention Patterns[1]

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INTRODUCTION

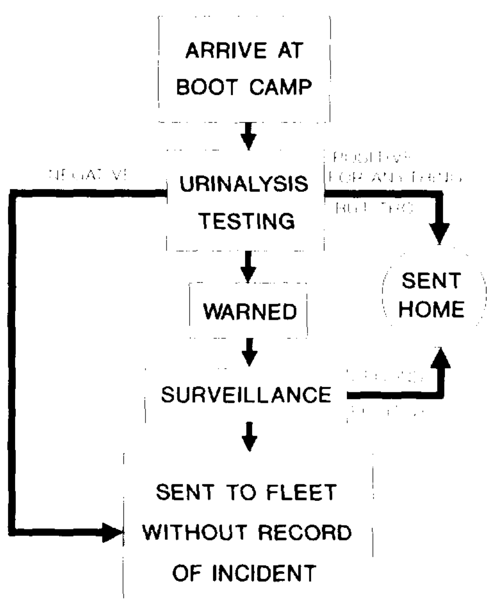
As part of a comprehensive drug testing program, the Department of the Navy tests all recruits for several drugs of abuse within hours after reporting to a Recruit Training Command. The present study examines a group of approximately 500 male recruits inducted in 1985 who tested positive for marijuana (THC) at accession and compares them with a matched group who tested negative. At that time, Navy policy dictated that sailors found to test positive for THC be retained in the Navy while those positive for other drugs be returned home. Significant demographic differences between the two groups were noted in education level, Armed Forces Qualification Test (AFQT) scores, and race. No differences were found in age, marital status, or home of origin. Retention data showed that 81 percent of the THC-negative and 57 percent of the THC-positive group were still in the Navy after 2.5 years. Reasons for discharge for the THC- positive group were much greater for alcohol and drug abuse or other behavioral or performance reasons. Sailors testing positive for marijuana at accession were divided into three groups depending on the amount of THC present in their urine. Significant differences in retention patterns for these three groups were not observed.

BACKGROUND

It has been known for some time that a substantial proportion of Navy recruits have had previous experience with drugs. Crawford et al., (1976) reported that 47 percent of those inducted into the Navy in 1975 had pre-service experience with drugs, with about 21 percent of the population using marijuana alone. This and other studies (Bray et al., 1983) suggested that drug abuse was a problem in the Navy. As a result, the Department of the Navy (DoN) implemented a urinalysis testing program in 1982 to routinely test for most drugs of abuse. In order to ensure the military fitness and good order and discipline of a unit, random sampling and unit sweeps are conducted. On the average, all sailors—from seaman recruit to fleet admiral—are tested three times a year. As of 1985, this testing program has reduced marijuana use among Navy personnel to less than 10 percent (Bray et al., 1986). This paper will focus on one aspect of the overall testing program—recruit testing.

This study's sample was drawn from recruits tested under the Navy's 1985 testing policy as shown in Figure 1. At that time, all recruits were (and still are) tested for all drugs of abuse within hours of arriving at a recruit training center (RTC). If the results showed they were positive for anything except tetrahydrocannabinol (THC)—the active ingredient in marijuana-they were administratively separated from the Navy and sent home. If the urinalysis was negative, they continued through school; perhaps they were tested again if their number randomly came up; ultimately, they went to the fleet without any record of a drug incident.

Figure 1.
1985 RECRUIT TESTING POLICY



If, however, the accession urinalysis test was positive for THC, recruits were warned, counseled, and perhaps put on a surveillance program of regular urinalysis. If, in any subsequent urinalysis, service members were positive for any drug of abuse, they were administratively separated and sent home. If results of subsequent testing were negative, it might be assumed that their first positive test was an unwanted hangover of recreational marijuana abuse in civilian life. As a result, their service record did not contain a drug use incident report.

This policy was predicated on the assumption that a positive test at accession into the Navy would serve as a stern warning to the sailor, tend to deter future incidents, and, as a result, performance problems during their career in the service would not be observed. It should be noted that this assumption was not supported by some evidence (Kolb et a1.,1975), which suggested pre-service drug abuse was related to performance decrements and disciplinary actions.

The purpose of the present study was:

- To compare and contrast the demographic characteristics of two groups of sailors—those who were positive for THC at accession and those who were negative
- To compare the attrition pattern of both groups—how long they remain in the Navy and why they leave
- To specifically examine the extent of drug or alcohol abuse problems
- To evaluate this information to see if it suggests any policy modifications.

The two latter items will be a continuing effort. Records will be re-examined about every 6 months.

METHOD

The authors visited the Navy Drug Screening Laboratory (NDSL) at the Great Lakes Recruit Training Center and collected data on 1,052 subjects who were tested for marijuana at accession between January 2 and March 4, 1985. Marijuana (THC) positives (approximately half of our sample) consisted of all subjects screened positive for THC (THC > 100 ng/mL urine) on a Radioimmunoassay (RIA) (Roche Diagnostics) screening test *only.* At that time, gas chromatography and mass spectrometry (GC/MS) confirmation tests were deemed unnecessary and were not performed on these samples because the results of this test did not appear on the individual's permanent record.

THC-positives were divided into three groups based on the RIA calibration table associated with each batch of samples:

- Low positive (THC > 100 ng/mL < 200 ng/mL)

- High positive (THC > 200 ng/mL)

- Very high positive (THC >> 200 ng/mL), i.e., upper approximately 10% of the calibration curve.

The latter group represented approximately 10 percent of all positive samples. The remaining samples were approximately equally distributed between the other two groups.

In order to match the THC-negative with the THC-positive subjects, an equal number of THC-negative subjects was selected from the same batch report from which the THC-positive sample was drawn. The RIA counts for these individuals indicated the lowest amount of marijuana in their urine, presumably zero ng/mL THC.

Demographic and attrition data were obtained from either: (1) the Navy Enlisted Master File, a data base maintained by the DoN Bureau of Personnel of all enlisted personnel currently in the Navy, or (2) from extracts of this file, maintained at the Defense Manpower Data Center (DMDC), containing data on all present or former Navy personnel. Data pertaining to subsequent drug positives were obtained from the Alcohol and Drug Management Information and Tracking System (ADMITS), a data base maintained by the Alcohol and Drug Abuse Prevention Division of DoN. Of the 1,052 all male subjects selected (half THC-positive, half THC-negative), 1,016 were found in the Navy Enlisted Master File or extracts. Of these, 964 records contained the data elements required for this study. It is not known to what degree the missing 88 subjects biased the sample. However, the same number of individuals seemed to be missing from the THC-positive group as from the THC-negative group. The point in time at which data bases were searched was approximately 2.5 years into a 4-year enlistment period for the subjects of this study.

All differences between groups cited as significant were significant at the p=0.01 level or better, using Chi square or Student "t" as noted in text or figure legends.

RESULTS

Significant demographic differences between the two groups were noted in education level, Armed Forces Qualification Test (AFQT) scores, and race. No differences were found in age, marital status, or home of origin. Retention data showed that 81 percent of the THC-negative and 57 percent of the THC-positive group were still in the Navy after 2.5 years.

Nonsignificant Differences

Some demographic characteristics did not differ significantly between the THC-positive and THC-negative groups. There were no significant differences in age because the age of recruits is quite constant. Average age was 20 years and median 19 years. More of the THC-positive subjects were single (95.6 percent) compared to the THC-negative group (93.3 percent). However, this difference did not approach significance. Using each subject's home-of-record zip code, we checked for any differences in the geographic areas from which recruits were drawn. While we had expected to see some cities or States more highly represented among the THC-positive group, no clear differences were found. The sample size may have been too small for such a comparison.

Education

Figure 2 shows that 6 percent of the THC-negative group were not high school graduates-a statically significant figure compared to 13 percent of the THC-positive group who did not graduate from high school. Figure 2 also shows that 11 percent of all 1985 recruits were not high school graduates—a number intermediate between our two groups.

Race

Figure 3 shows that, among the THC-negative group, 83 percent were white, 13 percent black, and 3 percent other. For the THC-positive group, 75 percent were white, 23 percent black, and 3 percent other. The percentage figure for all 1985 recruits is 15 percent black—again intermediate between our two groups. However, a significantly higher percentage of the THC-positive group was black when compared to the THC-negative group.

Occasionally, the Navy is accused of using urinalysis to discriminate against blacks. Our results do not make it possible to address this

Figure 2.

EDUCATION LEVEL

THC NEGATIVE VS. THC POSITIVE

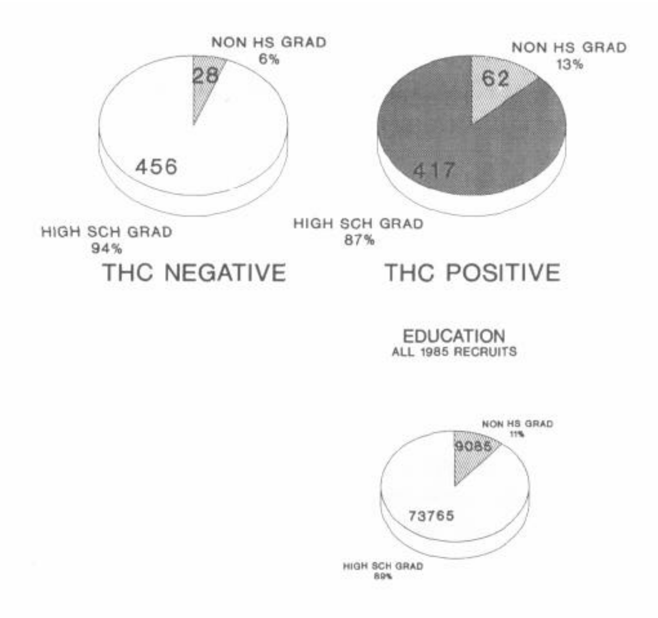
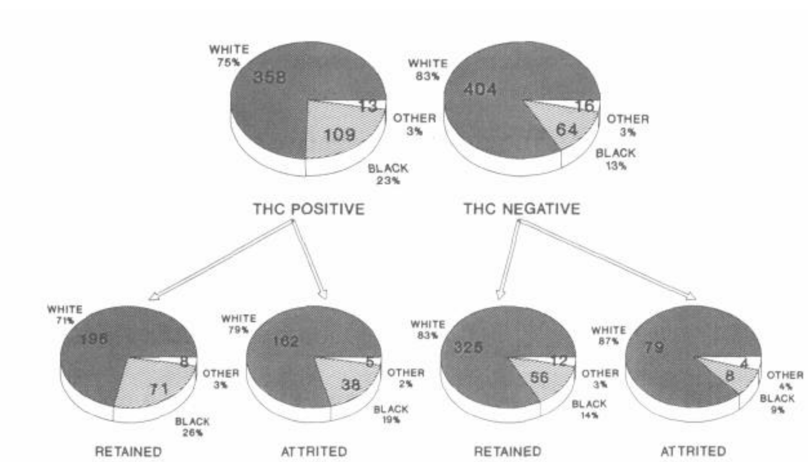


Figure 3.

RACE

ACCESSION THC NEGATIVE VS. THC POSITIVE

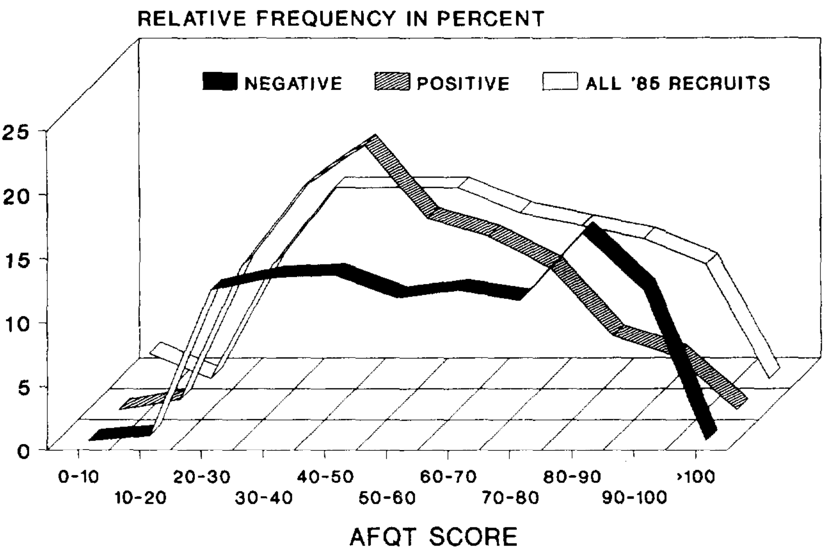


question directly. However, assuming the reasons for leaving the Navy are randomly distributed among different races, the pattern of the relative percentage of people retained after 2.5 years would be expected to parallel the accession population. Such is the case for the THC-negative group. For the THC-positives, however, a somewhat higher percentage of those retained are black when compared to the accession population. This data may suggest that the Navy is not trying to selectively discharge people on the basis of race.

Armed Forces Qualification Test (AFQT)

Upon entry into the Navy, all recruits are given the Armed Forces Qualification Test (AFQT). This test correlates highly with intelligence tests and is often considered an intelligence test. The line in the background of Figure 4 is the distribution of AFQT scores for all 1985 recruits. The distribution is fairly broad. The black line in the foreground is the AFQT distribution for the THC-negative population. It too is broad but somewhat skewed to the higher AFQT scores, i.e., higher intelligence. On the other hand, the distribution for the THC-negative group is definitely skewed in the other direction, i.e., there is a preponderance of somewhat lower AFQT scores. A "t" test between the THC-negative and THC-positive groups is highly significant.

Figure 4.
ARMED FORCES QUALIFICATION TEST
ACCESSION THC NEGATIVE VS. THC POSITIVE



Within each group (THC-positive or negative) there were no significant differences in AFQT scores between those still in the Navy and those who had left.

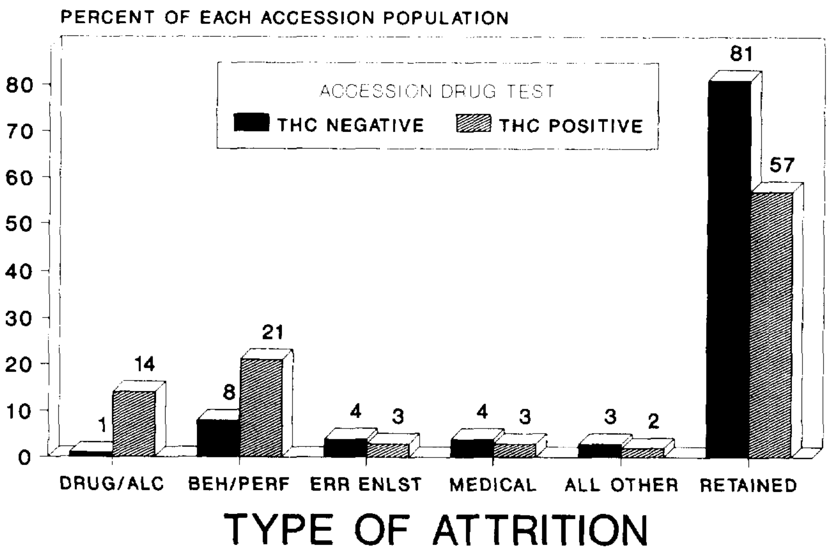
Attrition and Retention

As of September 1987, 81 percent of the THC-negative group and 57 percent of the THC-positive group were still in the Navy. This point in time occurred approximately 2.5 years after they entered the service and about 1.5 years prior to the end of their obligated service.

The reasons for discharge are indicated in the first five sets of blocks in Figure 5. Fourteen percent of the THC-positive group and 1 percent of the THC-negative left the service for drug or alcohol problems. We have not yet examined these records in detail to determine the nature of the problem; however, in most cases, we suspect abuse rather than drug distribution or manufacturing. The percentage of the accession drug-

Figure 5.

ATTRITION AND RETENTION
THC POSITIVE VS. THC NEGATIVE



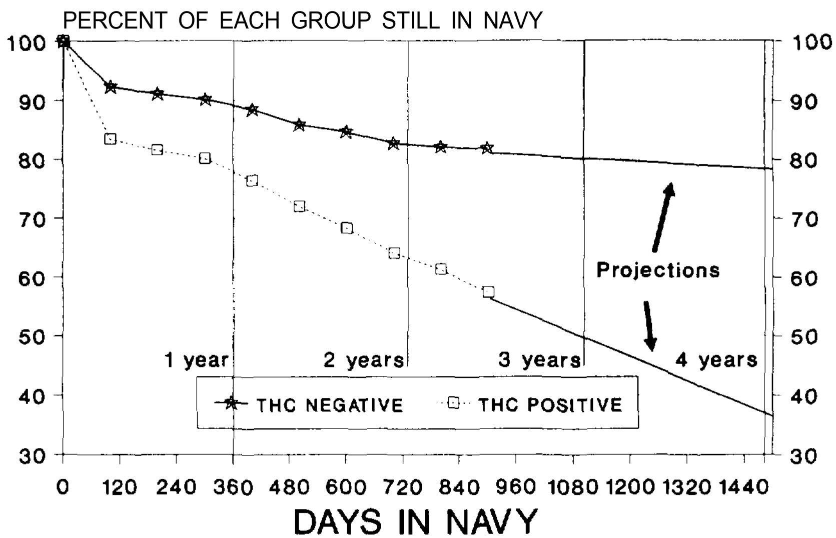
DRUG/ALC = discharge for drug or alcohol abuse, distribution, manufacturing, etc;
BEH/PERF = discharge for behavioral or performance reasons (see text);
ERR ENLST = discharge for erroneous enlistment; MEDICAL = discharge for medical reasons;
ALL OTHER = all other discharge codes.

positive group with a subsequent lab positive was about 14 percent, while that for the accession drug-negative group was a little over 1 percent. Twenty-one percent of the THC-positive and 8 percent of the THC-negative group were discharged for other behavioral or performance reasons. The 25 possible separation codes for this category include misconduct, commission of a serious crime, security breech, discreditable incidents, fraudulent entry, trainee discharge due to entry-level performance, and discharge for the good of the service. Far smaller and approximately equal percentages of individuals left. the service for erroneous enlistment of induction, medical, or other reasons. The "other" category included death as the major reason and a few dependency or hardship cases. The patterns of attrition/retention for the two groups were statistically significantly different from one another.

The attrition data can be examined in a slightly different way. Figure 6 shows the data at a fixed point in time, September 1987. At that point, for example, 81 percent of the THC-negative group and 57 percent of the THC-positive group are still in the Navy. However, knowing the exact date of their separation from the service, it is possible to calculate the percentage of each group that was still in the Navy for all times since their entry. Figure 6 shows these calculations. The next step is to project the amount of people in each group left in the Navy by the end of a 4-year

Figure 6.

RETENTION OVER TIME
ACCESSION THC POSITIVE VS. THC NEGATIVE



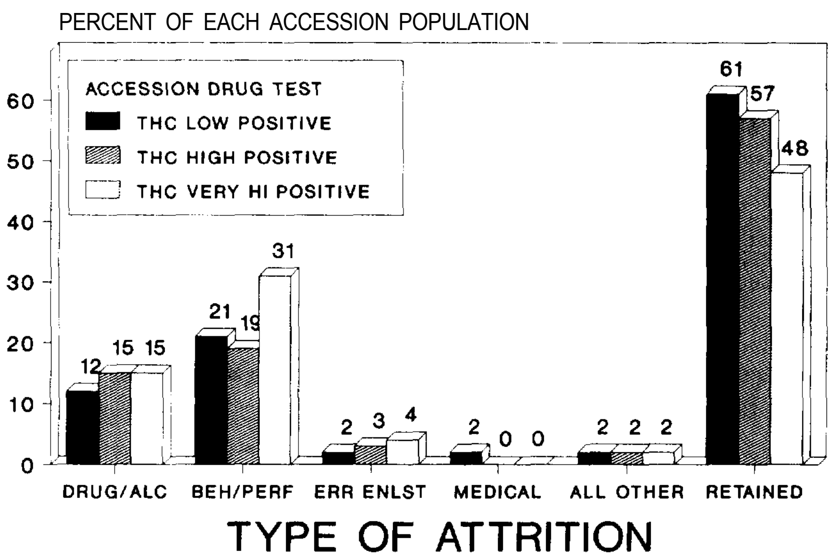
Projections are simple freehand linear projections to 4 years.

term of enlistment. This calculation is probably a worst-case projection, just a linear extrapolation. Therefore, at worst, an estimated 79 percent of the THC-negative group will complete a 4-year term of enlistment, while about 38 percent of the THC-positive group will complete an enlistment. In a recent study using 1980-1982 data, the Center for Naval Analysis calculated that 65.6 percent of all recruits complete their first term of enlistment—again, a number intermediate between our two groups.

As noted above, the THC-positive group was divided into three groups (low positive, high positive, and very high positive). For any of the comparisons, no significant differences between these three positive groups occurred on any variable. However, the data suggests some interesting trends. Figure 7 for example, indicates that 61 percent of the low positive group are still retained in the Navy at the 2.5-year point, compared to 57 percent and 48 percent retention for the two higher THC-positive groups. A corresponding increase in discharges for drug or alcohol abuse or behavioral or performance reasons occurs as the degree of THC positivity increases.

Figure 7.

ATTRITION AND RETENTION
ACCESSION THC POSITIVE GROUPS ONLY



Differences not significant

See Figure 5 legend or text for explanation of type of attrition.
See text for definition of low, high, or very high THC-positives.

CONCLUSIONS

While some demographic variables differ significantly, the variables themselves are probably not independent. It is tempting to conclude, based on AFQT scores, that less intelligent sailors are more likely to abuse drugs; however, AFQT scores surely co-vary with other variables, such as high school graduation. Each variable may simply be another way of looking at the same picture. As a result, no conclusions should be drawn about the etiology of drug abuse.

Care must also be exercised in considering the projections of attrition in Figure 6. The Naval Recruiting Command has suggested that the closer an individual gets to the end of his term of service, the more he is concerned and interested in completing it. Furthermore, supervisor tolerance of his behavior might also increase towards end of term.

Some results cannot be easily explained. For example, the distribution of AFQT scores for all 1985 recruits (Figure 4) is intermediate between the THC-negative and THC-positive groups. This distribution could not be created by a simple weighted average of the AFQT scores of our two groups. Similar findings were observed for race and education. It is conceivable that these differences and, perhaps, some of the attrition pattern differences could arise from the sample selection process. Demographic variables have a predictable cyclicvariation, dependingon the month of induction. Also, only one RTC was chosen—differences might exist between the populations at different RTCs. Also, higher drug abuse rates often occur during the months when our sample was drawn. It is also possible that the particular selection of the THC-negative sample was biased. The THC-negative sample was selected among individuals with the lowest amounts of THC in their urine, presumably zero ng/mL THC. The individuals with negative THC reports who were not selected for our sample might have had some THC in their urine but were below the NDSL cutoff level for a THC-positive specimen (100 ng/mLTHC). In other words, while not supported by data at this time, it is possible that recruits have a random distribution of THC in urine, closely following the distribution of total population demographic variables.

Failure to find significant differences in some cases (i.e., Figure 7) might simply reflect that the sample population selected was too small to make these comparisons. It might reflect inaccuracies in quantitation of the RIA screening test for THC. It is our intention to repeat this study with a larger population and to use GC/MS confirmation data that are available on samples more recently collected.

Since we intend to reexamine the data in March 1989 (the end of the enlistment period for the subjects of this study), this research report should be considered a preliminary report.

ENDNOTE

[1] The opinions expressed in this paper are those of the author and do not necessarily represent those of the author's organization.

[2] At the time the research for this paper was done the author was with the Naval Military Personnel Command.

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Does Pre-Employment Drug Use Predict On-the-Job Suitability?

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INTRODUCTION

Drug testing is increasingly used in the screening of applicants for employment. Despite the growth of drug testing, there is little research which examines the value of pre-employment drug use information in the prediction of post-employment suitability. Based on a sample of 10,188 young adults, this research 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 is first used, the greater the probability of a person being classified as unsuitable after hire. Those who use drugs which are consumed less frequently by the general population are at much greater risk of being judged unsuitable after hire. However, the operational validity of each drug variable is influenced by the base rate of drug use. The low base rates for some drugs makes their operational validity of limited value. The operational validity of the marijuana frequency of use measure (.07) is 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 ofgrowingconcern. About one half of work place injuries and nearly 40 percent of work place deaths are attributed to drug or alcohol use. Furthermore, 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 volunteer subjects lived and worked in wings of a hospital facility for 98 days 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 granted amnesty from prosecution for illegal drug use and who were 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 does not measure pre-employment drug use and uses an artificial work setting. The latter study suffers from subject selection contaminants and the collection of pre-employment drug use under anonymous conditions which fail to mirror the testing conditions in a pre-employment situation. To attempt to address the research gap on the drug use/suitability issues, 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. Several authors have reviewed the accuracy of self-reported usage of illegal drugs (Brown & Harding, 1973; Brown, 1974; 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 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 their drug use. 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 are the only available method of obtaining historical data on the respondent's use of drugs.

The predictive value of pre-employment drug use information can be evaluated in two ways: 1) the criterion-related validity of the drug use information, and 2) its usefulness in making employment decisions about individual drug users. In an operational screening setting, the value of a predictor is dependent on 1) the relation between the predictor and the suitability criterion and 2) the variance of the predictor which is a function of the drug use base rate in the applicant population. If drug use measures for two drugs have the same magnitude of relationship with the suitability criterion, they will have the same correlation with the criterion if the variances of the drug use measures are equal. If the use of one drug is rarer than another (e.g., stimulants versus marijuana), the variance of the lesser used drug measure will be smaller than the variance of the more frequently used drug, and the resulting correlation between the drug use measure and suitability will be smaller. Thus, for operational prediction purposes, the use of a less harmful (e.g., less addicting, less damaging to the body, perhaps more socially acceptable), but more frequently used drug (e.g., higher base rate) may be a better predictor of post-employment suitability than a more harmful yet less frequently used drug.

While the base rate of drug use in the population is an important determinant of its operational criterion-related validity, it is not relevant in evaluating the usefulness of a drug measure in making employment decisions about individual drug users. For example, if heroin addicts have a 90 percent probability of being fired for poor job performance, an employer making a hiring decision about a heroin-addicted applicant can use this information in making an informed hiring decision. This information is very useful to the employer for this applicant, even though the base rate of heroin addicts in the employer's applicant pool is so low that the operational validity is near zero. In brief, while the operational validity is an appropriate index of the usefulness of drug use measures for the applicant pool, drug use measures with low base rate and low operational validity can be very useful when making employment decisions about individual drug users.

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 1 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 discharge category includes unsuitable discharges stemming from alcohol and drug problems, "discreditable incidents," and other discipline problems, as well as dismissal from military training programs.

Table 1. Pre-employment Drug Use

Means, Standard Deviation, Percent Missing, and Reliability of Drug Measures

Variable	N	Mean	SD	% 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 responsew a s 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:
"neve" was coded 0;
"1-4 times" was coded 1;
"10-24 times" was coded 3;
"25-49 times" was coded 4;
"50 or more times" was coded 5.

The unsuitable discharge category does not include discharge from the service for medical reasons, dependency or hardship, or pregnancy. The reliability of this dichotomous criterion is unknown. In this sample of military accessions, 16 percent were discharged for unsuitability.

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 is no direct range restriction on the predictor. In addition, there is 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, the percentageofmissingdata, and the test-retest reliability for each item. The test-retest reliabilities are estimated from a subsample (N = 754) of individuals who completed the EBIS survey twice. The average test-retest time lapse is 38 days. The reliability for the frequency of heroin use item is -.01; this scale was dropped from further analysis. The reliability of the remaining drug variables range from .16 to .73. While the reliability of some of the items is low, such levels of reliability are not uncommon for single item measures. The percentage of missing responses ranges from 7.2 percent to 9.6 percent.

Table 2 presents the percentage of persons in each response category in nine drug variables who were classified on the criterion as unsuitable. Generally, while there are some departures from linearity, 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 have frequently used drugs are always higher than the rates for who reported no drug use, the number of persons who reported using drugs, particularly drugs other than marijuana, is small.

A drug composite scale was calculated by summing the drug questions with the two age questionsbeingreversed 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 never used drugs. Given that the nonresponders resemble 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

Table 2. Pre-employment Drug Use

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

	Age at First Drug Use				
	< = 14	15-17	> = 18	Never	No Response
Marijuana	21.0 (150/715)	18.2 (395/2176)	16.6 (109/655)	14.6 (859/5865)	19.6 (152/177)
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 Arrest	Arrest No Conviction	Conviction	No Response
Drug Offense	15.8 (1472/9329)	32.2 (29/90)	27.0 (10/37)	21.0 (154/732)

	Frequency of Drug Use (Times Used)						
	Never	1-4	5-9	10-24	25-49	>=50	No Response
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)	21.6 (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 (37/162)	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)

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 composite scale 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 composite variable.

Table 3 displays the observed correlations between the drug use items, the drug composite variable, a measure of general cognitive ability (AFQT), and the suitability criterion. Also listed is the percentage of persons, by item, who have used the drug at least once. For the drug arrest or conviction item, the listed statistic is the percentage of persons who were either arrested or convicted for a drug-related offense.

Table 3. Pre-employment Drug Use

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

Variable	r	% used at least once
Age at first use of marijuana	-.05	38
Age at first hard drug use	-.04	3
Drug Arrest/conviction	.04	1[a]
Frequency of Drug Use		
Marijuana	.07	31
Cocaine	.04	5
Stimulants	.07	13
Depressants	.07	5
Other narcotics	.05	2
Other drugs	.04	3
Drug Use Composite	.08	49
AFQT Percentile	-.06	NA
N = 9,207 to 10,188		

[a] 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.

Table 4. Pre-employment drug use

Moderator Analyses of the Validity of Pre-Employment Drug Use Composite Measure for Predicting On-the-Job Suitability

	N	r	Mean Drug Use	SD 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
Iv	986	.10	52.5	12.9	18
(Low Ability) 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 composite expressed as *t* score. High score indicates frequent drug use.

The validity of the drug composite variable 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 may 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 monotonicly 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 is 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 (Uniform Guidelines; Equal Employment Opportunity Commission, Civil Service Commission, Department of Labor & Department of Justice, 1978). Sex was not a strong moderator of the validity of the drug composite, although females reported lower levels of drug use than males. Race also was not a strong moderator of the validity.

DISCUSSION

Table 2 indicates that the 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 a drug offense; there is no meaningful difference in unsuitability rate 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 non-marijuana drugs is higher than in the present sample, one can expect the validity of the drug measures to increase. In this sample, marijuana has a moderately high base rate (31- 38 percent), 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.

Those persons with high cognitive skills as measured by the AFQT, are less likely to receive an unsuitability discharge, although 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 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. An alternative explanation is that the validity is attenuated by the skewed dichotomous split and potential reliability problems in the unsuitability criterion.

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, Reinarman, and Fagan (1975). 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.

In the present research, some drugs had stronger relationships with on-the-job suitability than other drugs, particularly when controlling for base rates (see Table 2). These differences in relationship magnitude can he 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 non-marijuana 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 presently 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 non-marijuana 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, while 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 presently 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 nonhigh school graduates is approximately twice that of those with school diplomas (Cheatham, 1978; Elster & Flyer, 1981; Flyer, 1959; Flyer & Elster, 1983; Means & Laurence, 1984; Sinaiko, 1977). In addition, research on several paper-and-pencil employee reliability measures (Betts & Cassel, 1957; Cough, 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

This study makes a contribution to the cumulative knowledge on the effects of pre-employment drug use on subsequent employment suitability. At the same time, however, the limitations of the study should be made explicit and the effect of these limitations on the results should be estimated. Four caveats are offered.

First, the questions are self-report measures of illegal acts. Once 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 are consistently more likely to be classified as unsuitable. For those who provide non-missing responses, it is reasonable to expect more of their responses to be underestimates rather than overestimates of pre-employment drug use. Effectually, this pattern of distorted responses limits the variance of the questions and thus underestimates 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 this underestimation if the respondents are 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 non existent, it is thought that military discharge categories are sometimes selected on the basis of administrative ease rather than the accuracy of their description. Thus, it may be possible that an unsuitable recruit may receive a fully honorable discharge if it hastens the recruit's separation from the service. This unestimated error may cause the validities to be an underestimate of the true relation between pre-employment drug use and on-the-job suitability.

Third, 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.

Fourth, this study's sample is drawn from a population that differs systematically from other populations of interest. The population of military recruits is young, predominately male, and seldom has education beyond high school. Due to military selection practices, those with higher cognitive ability measures have a slight tendency toward more pre-service suitability problems (traffic offenses, drug use, misdemeanors), than do those with less cognitive ability (Fitz & McDaniel, 1988). This occurs because "normal waivers" for pre-service suitability problems are more likely to be granted when the military applicant has other characteristics (e.g., high cognitive ability) that make him or her particularly attractive to the service. The positive correlation between pre-service problems and cognitive ability may also be due to self-election. The military service may not be viewed as the best career alternative by most cognitively-gifted individuals. However, those cognitively-gifted individuals who experience pre-service suitability problems may have more limited civilian-sector opportunities, and thus view military service more favorably.

These data and study design limitations preclude 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.

ENDNOTE

[1] This study was performed when the author was at the Defense Personnel Security and Education Center.

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A Critical Evaluation of the Utah Power and Light Company's Substance Abuse Management Program: Absenteeism, Accidents and Costs[1]

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INTRODUCTION

The substantial economic losses suffered by U.S. businesses attributable to employee abuse of alcohol and drugs justify drug testing in occupational settings. The Utah Power and Light's (UP&L's) management took an aggressive approach to substance abuse management, and designed their program with the objectives of making it as progressive and as technically sound as possible. Consistent with this management philosophy has been a critical review of the efficacy of the program, especially in light of the fact that little published data exist to substantiate the cost effectiveness of occupational screening programs. The purpose of this study was to evaluate organizational costs associated with drug-involved employees and to examine safety records for trends indicative of the deterrent effect of the program.

Demographic data for the drug positive, Group 1 (Gl), and voluntary rehabilitation, Group 2 (G2) employees, were statistically evaluated and compared to frequency matched control groups (CG1 and CG2), selected from the UP&L employee pool at large, based on age, sex ratio, job classification, years of service, and geographic distribution. Absenteeism data for G1, G2, CG1 and CG2 showed statistically significant differences, as analyzed by either the Student t-Test or the Mann-Whitney Test, in the use of sick leave and unexcused absences between G1, G2, and their respective controls. G1 employee absences averaged 64.6 hours greater than the CG1 mean. G2 absences totaled 47.5 mean hours/employee greater than the CG2 mean. Estimates of costs associated with these absenteeism abuses were $75,406. (All cost data are truncated.)

Expenditures associated with medical benefits use indicated that G1 costs to UP&L were actually $215 less than CG1 cost. However, G2 costs were statistically greater than CG2 costs.

Analysis of the total and mean number of vehicle accidents per month over the last 5 years showed an increasing trend in 1983 through 1985. This trend has stopped since the drug testing program was initiated in late 1985, and there have been statistically fewer accidents in 1986 and 1987. Members of G1 were at fault in 80 percent of the accidents reported for their group and were five times more likely to be involved in an accident than their control group.

A major organizational consideration in occupational drug testing is the cost associated with implementing and maintaining a substance abuse management program. Estimates of major costs associated with the initial planning meetings, field site preparation, legal fees, computer setup, analytical testing, the employee assistance programs, grievance procedures, and quality assurance expenses totaled $482,327. Potential savings from the program from decreased vehicle accidents, elimination of excessive absenteeism, and decreased turnover totaled $662,140.

Many of the items discussed are estimates of costs and savings associated with drug testing at UP&L; these represent tangible results of UP&L's program. Decreasing trends in vehicle and medical accidents demonstrate its effectiveness in providing a safer working environment. Elimination of problem employees, and identification and rehabilitation of valued employees with drug- or alcohol-related problems represent long-term investments by UP&L's management in the integrity and viability of the organization.

BACKGROUND

American businesses lose an estimated 50-100 billion dollars annually due to drug and alcohol use by employees (Hanson, 1986). These staggering figures reflect losses in a variety of areas, from decreased productivity to outright theft. Productivity losses maybe subtle, such as tardiness, increased absenteeism, and fewer hours spent per day at the work station, or, may be as obvious as on-the-job accidents. During the past 5 to 7 years, there has been an increasing awareness and concern in the United States about the adverse safety and financial effects of alcohol and drug abuse in the working environment.

Drug testing was proven to be an effective deterrent to substance abuse in the occupational setting by the Navy's response to the 1981 jet crash on the flight deck of the aircraft carrier Nimitz. Immediately following the accident, the Navy determined in a survey that 47 percent of their employees under the age of 25 were admitted drug users. By 1984, after the initiation of testing, the estimated number of users had decreased to 10 percent, and today it is believed to be less than 5 percent (Willette, 1986). The most important factor contributing to this decline, according to a 1986 Chemical Engineering News interview, was urinalysis drug testing (Hanson, 1986). Justification for widespread testing in the civilian work force has been prompted by the military's success, the desire to maintain a safe working environment, and the competitive need for U.S. industries to eliminate the wasteful costs associated with drug and alcohol use.

Occupational drug testing has been divided into three areas: *pre-employment testing,* screening applicants as an aspect of prehiring physicals; *for cause testing,* screening employees after an accident which results in medical treatment, significant property damage, or when abnormal behavior has been observed; and *random testing,* screening personnel on a statistically randomized basis such as computer-selected employee numbers. Preemployment and "for cause" testing have been supported by labor unions, civil rights groups, and court systems; random testing, however, has received substantial criticism. In each testing scenario, the potential for litigation exists, and analytical forensic procedures must be employed. Presently, it is estimated that 50 percent of all U.S. companies are performing preemployment testing (Frings, 1986).

Although anecdotally and from the safety perspective, substance abuse testing appears justified, there have been no published cost evaluations of programs to determine if the 250 million dollars spent annually by U.S. industries on drug testing is a judicious expenditure (Crouch, 1988). Thepurposeofthisreportistoreview cost and safety features of the Utah Power and Light Company's (UP&L) urine drug testing program and to determine its effectiveness.

Utah Power and Light Company

UP&L was established in 1912 and currently has 5,424 employees. The utility company serves approximately 516,000 customers in 400 communities. The geographic area served covers over 90,000 square miles in Utah and portions of Wyoming and Idaho, with a population of approximately 2 million. UP&L realized the importance of maintaining a drug and alcohol free work force and the potential liability of not performing substance abuse testing and, therefore, began discussing implementation of a comprehensive program in September, 1985. Preemployment testing began in November of the same year. By February of 1986, negotiations with union representatives concerning "for cause" testing were in progress. In March, 1986, policies were in place and a "grace period" established prior to the actual initiation of testing in July, Urine screening did not begin in earnest in the Mining Division until October, 1986.

Justification for drug testing came from safety incentives as well as other power industry concerns, as presented in an article by the Edison Electrical Institute, Human Resource Management Division (Edison Electric Institute, 1985). That article provides both the safety and societal rationale for urine drug testing by electrical power generating companies.

UP&L and its legal representatives realized the potential legal liabilities of an erroneous test result from the laboratory. Disciplinary action taken against an employee, or refusal to hire prospective employees, based on invalid test reports would result in both moral and legal liabilities. With these concerns in mind, UP&L retained forensic consultants to assist in identifying target drugs and a high quality forensic laboratory to perform their analytical testing.

During the initial laboratory evaluation portion of the program, drugs of potential abuse were identified. Significant classes of drugs identified included amphetamines, barbiturates, benzodiazepines, cannabinoids (marijuana constituents), cocaine and metabolites, ethanol, methadone, methaqualone, narcotics, and phencyclidine. The potential for any of these drugs to inhibit or impair work performance has been only marginally substantiated. However, all drugs listed are psychoactive and, therefore, may affect performance. Documentation of a high incidence of detecting these drugs in erratic, injured, and fatally injured drivers substantiates the need to include them in the testing protocols (U.S. Department of Transportation, 1980).

PROJECT OBJECTIVES

The purpose of this study was to research aspects of the occupational drug testing program at UP&L and evaluate the screening efficacy. Various drugs *may* impair work and work-related performance. However, information concerning the effectiveness of civilian drug testing as a deterrent to drug use and abuse and, therefore, the benefits of such a program to organizations such as UP&L, have not been demonstrated. As discussed, the Navy drug screening program is reported to be effective in deterring drug use; however, the benefits to the Navy have only been intuitive, and lack empirical evidence. We identified cost and human resource management parameters to lend insight into the effectiveness of UP&L's program. Employee injury and vehicle accidents are a major expense to any organization. Drug impairment increases the probability of either vehicle or industrial accidents occurring, therefore, trends in accident frequencies were monitored.

Although concrete absenteeism parameters have not been documented in occupational testing, some criteria have been proposed (Austin, 1987), and utilized in a study at the General Motors Corporation. A study of absenteeism and the GM drug testing program showed that 90 percent of the employees in a chosen GM Plant averaged 4 days of paid sick leave per year, but drug using individuals voluntarily submitting to employee assistance programs averaged forty days of paid sick leave per year. This group represented 3.5 percent of the work force. We expanded the GM model, and identified a number of areas to study in evaluating the deterrent effect and cost effectiveness of UP&L's program. Specific areas discussed in this report include the use of sick leave, unexcused absences, and, when available, medical benefits usage.

Safety indicators such as the number of on-the-job accidents, month-by-month and on an annual basis, were compared with accident frequencies for the 3 years prior to the inception of the program.

A final aspect of the study was to identify costs attributable to UP&L's drug testing. To obtain the necessary data, individuals were grouped together based on whether they had voluntarily submitted to employee assistance counseling for drug problems or have been identified as drug positives by the screening program. From these groups absenteeism frequencies were determined, and financial inferences were drawn concerning the cost to UP&L. We further identified vehicle and medical injury accident frequencies and the use of medical benefits by these groups.

METHODS

To obtain and manipulate the necessary information two computer data bases were established. One contained drug test results and related screening information. Specific data items included were employee number, social security number and turn-around time for test results. Other pertinent data included in the program concerned the basis for testing (pre-employment, rehabilitation, or promotion) and collection site. A second data base included items identified from UP&L's vehicle accident report form and the employer's medical injury report form. These two documents provided details related to the demographics and geographics of absenteeism and vehicle or medical accidents. Included were age of the individual, sex, duration of employment, date and hour of the injury, hour the shift commenced, number of work hours lost for treatment, extent of the injury, location of the accident, job classification of the individual, and a general description of the job task. The accident report form identified the vehicle type, the date, time, location of the accident, any damages which occurred to UP&L owned vehicles, damages to vehicles of outside parties, and an assignment of fault.

The second major aspect of this study was to evaluate the use of the Employee Assistance Program (EAP) and to identify, if possible, demographic characteristics of the "high risk"group. Social security numbers of individuals having either voluntarily or involuntarily submitted to counseling were obtained. *Complete* anonymity of all individuals was maintained. The social security numbers of the control groups discussed below were added to the volunteer list consisting of 27 individuals. Thus, when the main frame computer was searched and the PC data base created, no mechanism existed to identify which individuals had submitted to the EAP. The total number of social security numbers submitted was approximately quadrupled, and 135 (27 + 108) were submitted for searching. A similar technique was used with the drug positive group, where 59 social security numbers were searched.

Control Groups

To statistically validate our approach to analyzing absenteeism, medical benefits use, and accident frequencies, two control groups were identified from the employee pool at large. One control (CGI) was established for those individuals found to have drug screening positive urines (G1). A second group (CG2) served as the control for those employees who volunteered for the employee assistance program (G2). A total of 12 utility employees tested positive for drugs during the study period. Demographic characteristics of this group (age, male:female ratio, job classification, years of service, and geographic distribution) were determined and frequency matched by the control group (Table 1). kequency matching is a technique which selects the control population in the same proportions as the target group for the defined characteristics. All data are tabulated and presented in Table 1. Control groups similar in demographic and geographical characteristics to G1 and G2 should accurately reflect cost data associated with absenteeism and use of employee benefits. These groups were established to include four times

Table 1. Demographic and Geographic Data

	Group #1	Control #1	Group #2	Control #2	Total Pool
Age (Mean)	32.58	33.06	37.37	36.52	37.2
Female	27	—	36	—	—
Male	34	—	38	—	—
Sex					
Female (%)	25	26	11	11	23
Male (%)	75	74	89	89	77
Job Classification					
1	9	35	17	67	—
2	1	4	3	12	—
3	0	0	2	9	—
4	2	8	5	20	—
Years of Service	6.95	8.8	12.60	10.52	9.50
Average Salary/Mo	2200	—	2493	—	2628
Geographic Area					
Utah	9	39	19	92	3923
Idaho	1	2	1	7	282
Wyoming	2	6	8	9	297
Other	0	0	0	0	7
Racial Distribution					
White	10	—	25	—	4234
Nonwhite	2	—	2	—	275
Total Population	12	47	27	108	4509

as many members as G1 or G2, to validate statistical comparisons. These parameters help remove biases not associated with drug use which may have affected our data. First, age could relate to increased medical benefits use. Second, certain jobs have an inherently higher risk of injury accidents than others, (such as clerical or managerial positions). Third, years of service might be important in establishing experience on the job, which relates to the probability of having an accident. Finally, sex differences affect the use of medical benefits for child bearing and related care.

Job classifications were defined as: Class 1, laborers, operators, and craftsmen; Class 2, secretarial and clerical workers; Class 3, professional and technical workers; and Class 4, management. Column 5 of Table 1 contains data on the total UP&L employee pool. The total employee pool is presented only for comparison purposes and was not used as a control for statistical testing.

The mean age of G1 was 32.58 years, matched in CG1 by a mean age of 33.06 years. The G1 population was 25 percent female and 75 percent male; the frequency matched control group was 26 percent female and 74 percent males. Nine of the 12 individuals identified in G1 were from job class 1; one from job class 2; none from job class 3; and two from job class 4. In the CG1, there were 35 from class 1,4 from class 2, none from class 3 and 8 from class 4. The average years of service for G1 and CG1 were 6.95 and 8.8, respectively. The salary of G1 employees averaged $428 per month below the total employee pool. Most G1 individuals were from Utah, which was not surprising since 93 percent of all UP&L employees are Utah residents. Idaho and Wyoming were somewhat underrepresented in CG1. Demographic data concerning racial distribution were also included; however, frequency matching was not performed on this parameter. The total populations of G1 and CG1 were 12 and 47, respectively.

G2 volunteers for rehabilitation had a mean age of 37.37 years and CG2, 36.5 years. The male:female ratio was exactly matched at 89 percent to 11 percent in both G2 and CG2. All job classifications are represented proportionately to G2 in the control population. Years of service were approximately 2 years less in the control than in G2. The mean salary of those individuals who submitted to rehabilitation was less than the UP&L mean, but considerably closer to the overall mean than that found in G1. The majority of the rehabilitation population was from Utah. An interesting feature shown in the exhibit is that Wyoming was over represented in both G1 and G2. Although only 7 percent of all UP&L employees resided in Wyoming, 25.6 percent of G1 and G2 members

Table 2. Implementation and Maintenance Costs

Item	Description	Cost	Potential Savings
Start Up/ Implementation			
Consultants	Establishing Lab/Drugs of Interest	$7,000.00	
	Consult. Time for Cost Analysis	$750.00	
	Travel to Inspect Labs	$3,750.00	
Initial Meetings	Instructional Union/Employees	$2,000.00	
	Management/Consultants	$3,500.00	
Field Awareness	Educating Collection Sites Travel	$2,000.00	
	UP&L Mgmt/Medical Lab Evaluation	$2,500.00	
	Drafting Policy	$1,000.00	
	Brochures and Materials	$5,000.00	
Legal Fees	Liability and Policy Questions	$5,000.00	
Employee Time	Mgrs/Secretarial/Other	$25,000.00	
Computer Data Entry	Operator and Materials	$2,500.00	
Total		$60,000.00	
Daily Operation			
Testing	1036 Tests x $35/Test	$36,260.00	
Quality Assurance	Quality Control Sample	$4,100.00	
Analytical	Misc. Supplementary Tests	$450.00	
Employee Time	Health Specialist/Medical Consultant/Secretarial	$60,000.00	
Hidden Costs			
Lost Time	Lost Hrs on Job Awaiting Test Results 131.40/day x 0.6 days/ Result x 1036 Tests	$81,678.00	
	50% Benefits	$40,839.00	
Managers' Time	Supervision		
EAP 1986	Increase over 1985	$31,000.00	
EAP 1987	Increase over 1985	$39,000.00	
Psych Benefits	Benefits for Chemical Dependency	$69,000.00	
Grievance	Belated to Increase in Grievances (12 x $5000 each)	$60,000.00	
Total		$482,327.00	
Potential Savings	Savings Issue		
Accidents	Vehicle Accidents 1986		$130,152.00
	Vehicle Accidents 1987		$150,858.00
Absenteeism			
Change Over Control	Unexcused		$21,523.00
	+ 50% Benefits		$10,761.00
	Sick Leave Abuse (2X)		$28,748.00
	+ 50% Benefits		$14,374.00
Medical Benefits	Group 2		$5,724.00
Turnover	Est. of Turnover Drug Related		$300,000.00
Total	Subtotal Without Turnover		$362,140.00
	Total With Turnover		$662,140.00
Grand Totals		$482,327.00	$662,140.00

were from that State. Racial distribution was determined for G2, but not frequency matched. The total populations of G2 and CG2 were 27 and 108, respectively.

The final aspect of this study was to determine startup and maintenance costs of the program. Initial startup costs included estimates of the time involved in researching the feasibility of occupational drug testing at UP&L; time and material costs for preparing the policy statement and documentation associated with presenting the program to employees; cost of sending the Health Services Specialists to educate employees at the 125 collection sites throughout the UP&L service area; costs of meetings with consultants to identify a laboratory and monitor laboratory performance; the consultant retainer; the cost of computer time involved in setup and data entry; and the initial meetings and attorney's fees associated with creating a written policy statement and identifying the drug list. These items are addressed in Table 2. Maintenance costs were identified from a number of different areas. Salaries of the key UP&L employees interfacing with the laboratory and disseminating report information were included. The salary of the secretary, estimates of the Medical Consultant's and Health Services Specialists' salaries, and a portion of the salary of the Employee Relations Manager, who is involved in administering disciplinary decisions from the testing procedures, were included along with costs associated with the EAP.

Table 3. Screen and Turnaround Time Data

Item	Total	1986	1987
Screens			
Preemployment	342	(62%) 162	(24%) 180
Promotion	283	(14%) 36	(33%) 247
Accident	312	(19%) 50	(35%) 262
Performance	8	1	
Rehabilitation	28	3	(3%) 25
Volunteers	8	5	3
Other	0	0	0
Quality Control	55	6	49
Totals	1036	263	773
Turnaround Time			
For Results (Days)	2509	944	1565
Average/Test	2.42	3.59	2.03
Lost Work	617	139	478
Ave Lost Wrk/Screen	0.6	0.53	0.62

Table 4. Drug Distribution and Findings by Indication for Testing

Item	1986 utility	Mine	1987 Utility	Mine	Totals
Positive Screens	9	4	9	6	
Totals	Total (13)		Total (15)		28
Reason For Positive Screen					
Accident	3	3	5	2	13
Preemployment	6	1	0	3	10
Rehabilitation	0	1	2	1	3
Performance	0	0	2	0	2
Totals	9	4	9	6	28
Drugs Detected					
Cannabinoids	Total (11)		Total (14)		25
Cocaine	Total (1)		Total (0)		1
Cannab & Cocaine	Total (1)		Total (0)		1
Cannab and Other	Total (0)		Total (1)		1
Totals	13*		15		28
Drug Free	Total (250)		Total (758)		1008

*13 Positives/12 Emp.

RESULTS AND DISCUSSION

During the study period, UP&L's testing lab performed 1,036 drug screens (Table 3). These were divided into preemployment, promotion, postaccident, performance, rehabilitation, volunteer, and quality control specimens. These data were then subdivided into three areas: the total number of screens performed in each category; the total in 1986; and the total in 1987. As shown in the exhibit, the majority of screens over the 2-year period were for preemployment. However, in 1987, screening "for cause" was the most indicated reason for testing. In fact, in 1987, approximately 35 percent of all screens were requested following an accident; in 1986, this number was only 19 percent.

Turnaround time was an important factor needed to estimate the cost of the program to UP&L. Turnaround time was defined as the latent time period from collection of specimen to receipt of the test results. In 1986, the average turn-around time was 3.59 days. In 1987, this time period decreased to 2.03 days, but averaged 2.4 days for the 2-year period. A total of 617 work days were lost while suspended employees awaited test results. The average number of work days lost per screen performed was 0.6 for the study period. To extrapolate this as a cost item, 0.6 was multiplied by the average salary per day for UP&L employees ($131.40 per day), resulting in a total cost of $81,678, or $79 per test. The average charge for collection and analytical testing was $35 per test—$44 per test less than the lost time figure.

Drug Distribution

Nine positive screens were reported in the Utility Division in both 1986 and 1987, while the Mining Division had four positives in 1986, and six in 1987 (Table 4). The indication for testing associated with a positive result was important in assessing the deterrent effect of the program. Postaccident screens in the years 1986 and 1987, resulted in 13 of the 28 positive screens, representing approximately 46 percent of all positive findings. Preemployment screening produced approximately 36 percent of all positive findings, making testing an important de-selection criterion in maintaining a drug free work force at UP&L. The cost of replacing employees and turnover rates is addressed in Table 2, and later in this report. Performance-related and rehabilitation screens resulted in two and three positive findings, respectively, during the study period.

A total of 25 of the 28 drug positive urines contained only cannabinoids (marijuana constituents). Of the two specimens containing cocaine, one contained cocaine alone, the other cocaine in combination with cannabinoids. In only one incidence were cannabinoids detected with methadone, opiates, or other drugs. A significant finding was that 27 of the 28 positive employee urines contained cannabinoids. It should be noted that alcohol testing was not performed on a routine basis during this study.

Absenteeism

The groups and corresponding controls were used to compare absenteeism, medical benefits use, vehicle accident frequency, and associated costs. Table 5 shows that, prior to evaluating absenteeism data, population distributions were tested for distribution characteristics. The value and its significance levels are given; a level of significance of 0.05 was used in all statistical evaluations. If the data were normally

Table 5. Absenteeism Data 1986-1987 in Hours

Item/Group	Group 1 1986-1987	Control Group 1 1986-1987	Group 2 1986-1987	Control Group 2 1986-1987
Sick				
Mean	75.3	55.8	81.7	56.3
Std. Dev.	15.2	30.6	75.2	37.8
Range	(40-100)	(0-220)	(0-336)	(0-232)
Normality Stat	.11=Normal	.13=Normal	0.7=Normal	.11=Normal
Vacation				
Mean	108.9	120.4	122.2	138.7
Std. Dev.	29.5	34.3	56.7	42.8
Range	(32-164)	(16-200)	(0-240)	(16-255)
Normality Stat	.18=Normal	.12=Normal	.14=Normal	.09=Normal
Unexcused				
Mean	63.8	18.7	32.2	10.1
Std. Dev.	106.6	66.7	96.6	50.9
Range	(0-420)	(0-456)	(0-809.5)	(0-616)
Normality Stat	.07=Normal	.00=Not Norm	.003=Not Norm	.00=Not Norm
Total Absences				
Mean	251.9	196.2	237.4	207.8
Std. Dev.	108.9	86.2	138.1	74
Range	(84-624)	(56-616)	(0-809.5)	(51-784)
Normality Stat	.13=Normal	.04=Not Norm	.14=Normal	.04=Not Norm
t-Test Sick vs Cont	0.003		0.001	
Conclusion	Means Not-		Means Not-	
t-Test Vac. vs Cont	0.132		0.018	
Conclusion	Means=		Means Not=	
Mann-Whitney				
Unexcused vs Cont	0.00		0.00	
Conclusion	Means Not=		Means Not=	
Mann-Whitney				
Total vs Cont	0.001		0.09	
Conclusion	Means Not=		Means=	

distributed, parametric in nature, an independent Student t-Test was performed to determine the relationship between the control and experimental population. If, however, the data were found to be nonparametrically distributed, a Mann-Whitney Test was performed. Table 5 shows that the G1 mean number of sick hours accumulated was 75.3, compared to the CG1 mean of 55.8, a significant difference of 19.5 hours per individual. This is reflected as a cost and presented in Table 2. Interestingly, vacation days were found to be equal and probably relate more to duration of employment or to other factors. Unexcused absences varied from a mean of 63.8 hours for G1 to 18.7 hours for CG1; the resulting difference was 45.1 hours per individual. The Student t-Test indicated that means were statistically different. Total absences, including vacation, were also found to be significantly different. The total difference in absences between G1 and CG1 was 55.7 hours per employee and is primarily a reflection of unexcused absences. All absenteeism information has been transformed into cost estimates and is discussed below.

Also presented in Table 5 are the absenteeism data for G2 and CG2. The mean number of sick days were statistically different between the two groups, with G2 missing 81.7 hours and the control missing 56.3. The difference was 25.4 hours, or slightly greater than 3 days annually. As in G1, the use of vacation time was nonparametrically distributed; however, the Mann-Whitney Test indicated that G2 and CG2 differ. The difference between G2 and CG2 mean total absences was approximately 2 working days and was the result of unexcused absences and sick day use. Unexcused absences were statistically different, with G2 reporting 32.2 hours and CG2, 10.1. The Student t-Test indicated that the 22.1 hour mean difference was significant. The mean total number of hours absent for G2 was 237 versus 207.8 for CG2; these were not statistically different.

Two major cost items to UP&L were unexcused absences, reflected as lost productivity and a corresponding increase in the number of employees needed to cover work assignments, and use of sick days. The total for G1 was 64.6 hours per employee, approximately 8 working days greater than the control group. For G2,47.5 hours per employee, or 6 working days greater than the mean of the frequency matched control group were missed.

Medical Expenditures

An evaluation of medical benefits use data indicated that there was little difference between 1986 and 1987; therefore, all data were combined for statistical evaluation (Table 6). In G1, total claims for the study period were $16,251, with a mean of $1,354 per employee, and $677 per employee per year. UP&L reimbursed approximately 75 percent of the total employee expenditures, resulting in total cost to UP&L of $12,117, $1,009 per employee, and an annual expenditure per employee of $504. The total 1986-87 claims in CG1 were $77,340, with a mean of $1,646 per employee and total annual claims per employee of $823. UP&L paid approximately 88 percent of these claims, resulting in a $67,900 expen-

Table 6. Medical Expenditures 1986-1987

Item/Group	Group #1	Control Group 1	Group #2	Control Group 2
Total Claims	$16,251	$77,390	$68,465	$122,707
Mean/Employee/2 Years	$1,354	$1,646	$2,535	$1,136
Mean/Employee/Year	$677	$823	$1,267	$568
Std. Deviation	$911	$2,932	$263	$1,371
Range	0-3138.80	0-27012.60	2-12076	0-11567.50
UP&L Contribution	$12.117	$67.900	$35,848	$97,077
Mean/Employee/2 Years	$1,009	$1,438	$1,324	$898
Mean/Employee/Year	$504	$719	$662	$449
Std. Deviation	$718	$2,675	$1,906	$1,291
Range	0-2372.80	0-24485.70	0-111190.80	0-11391.50
Percentage Covered	75%	88%	52%	79%
Normality Stat	0.054	0.000	0.004	0.000
Conclusion	Normal	Not Normal	Not Normal	Not Normal
Mann-Whitney				
PDvsCon Pd		0.031		0.044
Conclusion		Means Not=		Means Not=
Number of Observations	12	47	27	108

diture. Over the 2-year period, this averaged $1,438 per employee with an annual cost of $719 per employee. These data demonstrate that CG1 expenditures were greater than the drug positive group ($719 per year versus $504 per year) by $215 per employee.

G2 total claims over the two year period were $68,465. The 2- year mean claims per employee were $2,535 and the annual mean claim was $1,267. Of the total claims, UP&L paid 52 percent, placing actual costs at $35,848, with the mean over the 2-year period of $1,324, and an annual costs of $662 per employee. Total CG2 claims for the 2-year period were $122,707, the mean was $1,136 per employee, and mean annual claims per employee totaled $568. Claims paid by UP&L for the 2-year period totaled $97,077. The 2-year mean per employee was $898, and annual expenditure was $449 per employee. Two interesting features are shown in the table: G2 annual claims of $1267 per employee are much greater than CG2 claims of $568; and UP&L paid only 52 percent of G2 claims. This is explained by UP&L's medical benefits policy which pays a maximum of $30 per psychiatric visit. Any amount over $30 per visit or $500 annually must be paid by the employee. A review of G2 records indicated that psychiatric claims (which might be associated with drug or alcohol dependency) constituted a major portion of the unpaid claims.

FIGURE 1: VEHICLE AND MEAN VEHICLE ACCIDENTS 1983-87

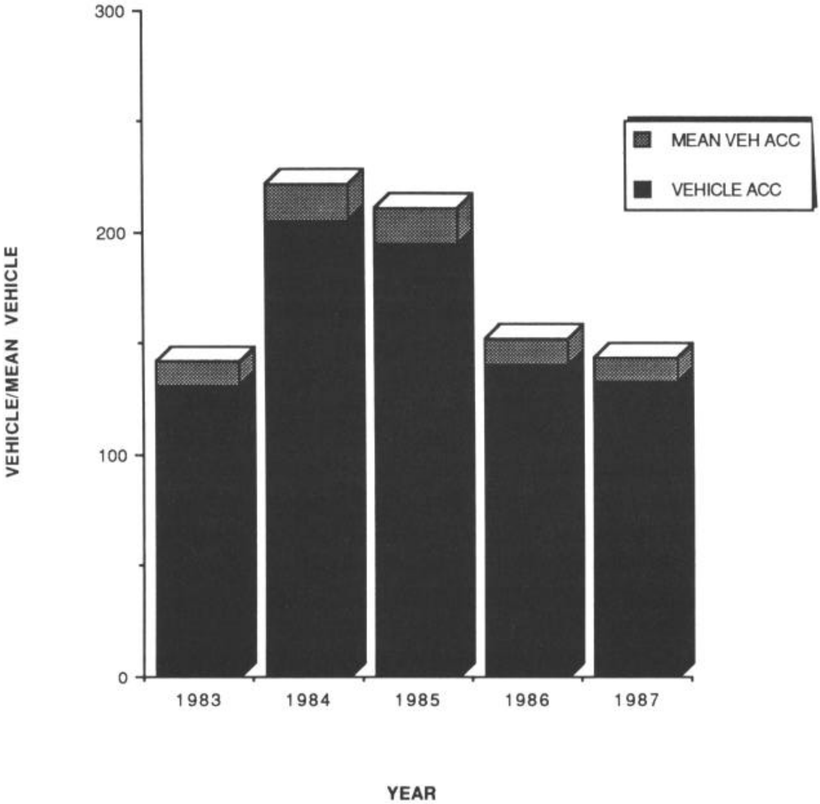
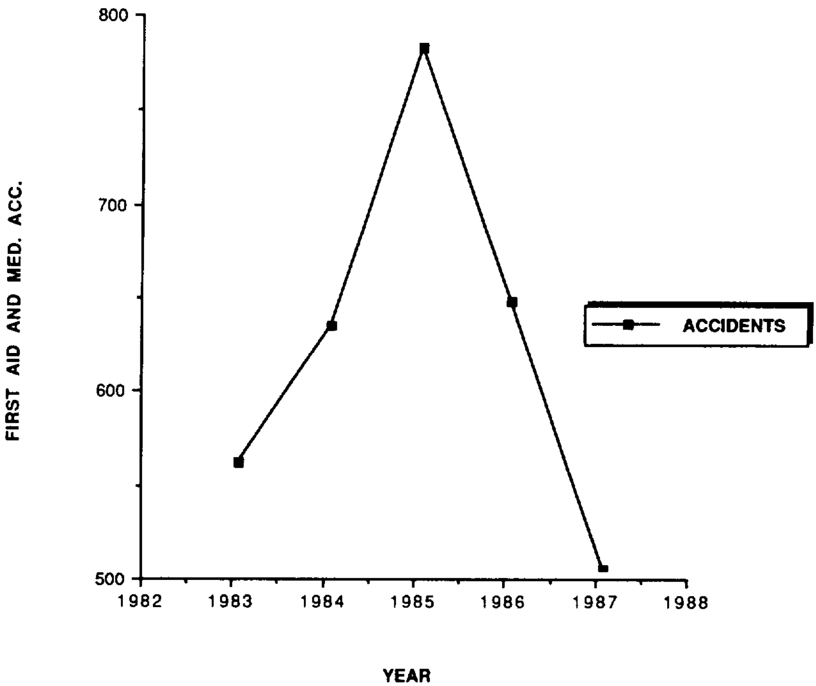


Table 7. Vehicle Accidents Per Group 1986-1987

	Group 1	Control Group 1	Group 2	Control Group 2
	(n = 12)	(n = 47)	(n = 27)	(n = 108)
Total No. of Accidents	5	4	3	11
At Fault (%)	4 (80)	2 (50)	1(33)	4 (36)
Damages to UP&L or External Vehicle/ Property	$49,800	$200	$700	$6,000

FIGURE 2: MEDICAL AND FIRST AID INJURIES 1983-87



Vehicle Accidents - Medical Injury Accidents

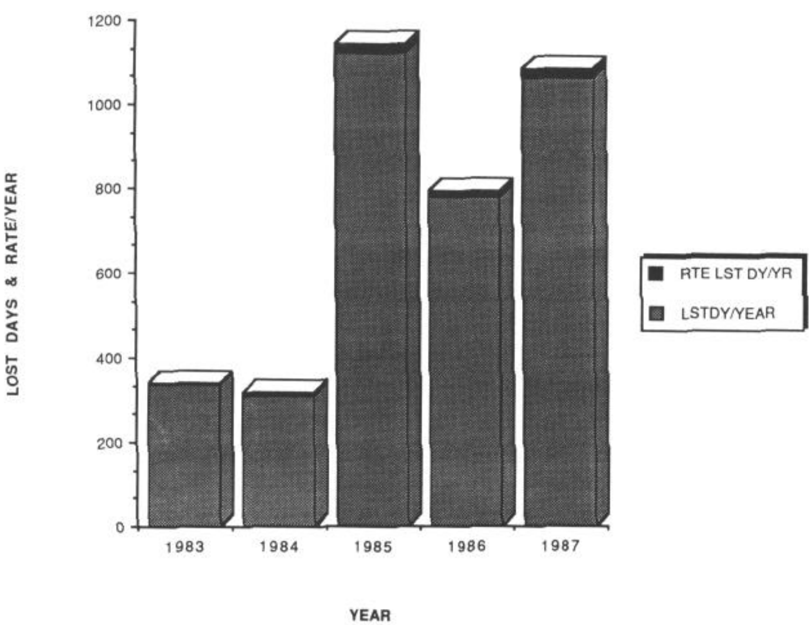
Figure 1 displays the frequency ofvehicle accidents for the last five years at UP&L. Accidents increased in the years 1984 and 1985 above 1983 levels, however, 1986 and 1987 compared favorably with 1983. We were interested in identifying any significant changes in trends for 1986 and 1987 over previous years. To determine the cost to UP&L associated with vehicle accidents records were searched, by employee number, for individuals in all four groups (Table 7). When an accident was identified which involved a group member, data were obtained concerning damage to UP&L vehicles, damage to other vehicles or property, and driver "fault" was assigned. The results were not conclusive. Many vehicle accident report forms were only partially complete, damages to UP&L or external vehicles were estimated or not present, and records for at least one major accident known to involve a G1 individual could not be located. The data have been included because we were aware that this accident occurred during the study period, but this example makes the authors suspect of the validity of the data for statistical comparison; therefore, the cost data presented are at best an estimate.

The "at fault" data show that the drug positive individuals caused 80 percent of the vehicle accidents in which they were involved, compared to 50 percent for CG1 (Table 7). G2 members were at fault in 33 percent of their accidents and the CG2 members were responsible in 36 percent of the crashes. The average cost per accident was $9,960 in G1, less than $200 for G2, less than $200 for CG1, and $545 for CG2. The G1 data are skewed by the major accident that totaled $40,000 in damages. However, if this accident is removed from the data, the average cost per accident from G1 was still $2,450, a tenfold increase over the control group mean, and an indication that more serious vehicle accidents are likely to occur in the drug user population.

These data can also be used to calculate the increased likelihood of having an accident for Groups 1 and 2. Calculations showed that G1 was five times more likely to have a reportable vehicle accident than CG1. G2 was no more likely to have an accident than CG2.

There were mean decreases in the total number of accidents per month at UP&L from 16.2 to 11.8 (4.4 accidents per month) in 1986, and a

FIGURE 3: LOST DAYS AND RATE - FROM MEDICAL INJURY ACCIDENTS



decrease from the 1985 mean of 5.1 accidents per month in 1987 (Figure 1). In total, the 1985 to 1986 decrease translated to 52.8 mean fewer vehicle accidents per year. The average cost per accident for the accidents investigated over the 2-year period, was $2,465. Therefore, the accident reduction resulted in a savings to UP&L of $130,152 (Table 2). Comparing the 1987 mean of 11.1 accidents per month to the 1985 mean of 16.2 showed a difference of 5.1 accidents per month, or 61.2 fewer accidents per year and a savings of $150,858 (Table 2). Scientifically, the authors can not assume that the decrease in vehicle accidents was solely attributable to the drug testing program, and, although an actual causal relationship should not be drawn between these data and drug testing, the trend is apparent.

Trends in reportable medical accidents and injuries requiring first aid were also evaluated (Figure 2). These data, like the vehicle accident data, were examined for trends, and should not be used to draw a causal relationship between drug testing and the decreases. The total number of accidents increased through 1985. In 1986 and 1987, there was a decrease.

Not all trends were as readily interpreted. Lost work days and the rate of lost days per 200,000 man-hours worked, resulting from medical injuries (grouped and analyzed by quarter), were evaluated for the years 1983-87 (Figure 3). The total number of lost days resulting from medical injuries increased dramatically in 1985 and remained elevated in 1986 and 1987. There were no obvious reasons for this phenomenon; however, discussions with the Safety Department revealed a change in the mechanism of record keeping which began in 1986. Prior to that year, medical injuries were tallied by month, and lost days recorded if the employee missed days in that period. Currently, when an accident occurs, the number of days the employee will be away from the job site is estimated, and the predicted lost days are then attributed to the accident. In quarters 1 and 3 of 1987, the total number of lost days was inordinately high as a result of two major accidents with predicted recuperation periods much longer than the total 80-day working quarter. In addition to the increase from procedural changes, since implementation of the substance abuse program, employees tested for drugs following accidents are suspended pending receipt of the results. As stated earlier, the average turnaround time for results has been 0.6 days and 35 percent of all screens performed in 1987 were requested as a result of accidents. Therefore, approximately 157 of the lost days are attributable to this process. For the reasons just stated, lost work days data do not truly reflect causative effects from the drug screening program, but demonstrate that data review needs to proceed cautiously in retrospective occupational studies.

Costs

Costs associated with the program such as consultant fees, initial meetings with unions and employees, education of the field collection sites, daily operations including specimen collection and testing, quality control testing, and analytical support by consultants are shown in Table 2. There were many hidden costs in the program, including lost time by injured employees awaiting drug screening results. Other items included in Table 2 are the retainer for the EAP and the use cost of the EAP. Listed costs reflect increases over 1985 prices and, therefore, reflect changes associated directly with the drug screening program. The total cost of 12 drug positive cases to the third stage of the grievance process was $60,000.

Potential Savings

To determine the cost effectiveness of the screening program, several assumptions were used. The following items shown in Table 2 are estimates representing potential savings to UP&L.

1. Absenteeism

Unexcused absences were 8.4 days (67.2 hours per study period) greater in G1+G2 than in CG1+CG2, when multiplied by the populations of G1+G2 (39) and by the average daily salary per employee ($131.401, represent a cost to UP&L of $21,523 annually, and with benefits a total cost of $32,284 (annually). If UP&L can achieve a drug free workplace, a potential savings of $32,284, per annum could be realized. The same logic was applied to determine the cost associated with excessive sick time use. The mean total of G1+G2 was 5.61 days (44.9 hours) greater than CG1+CG2, multiplied by the average salary of $131.40 per day and by 39 employees, the resulting potential savings was $14,374 in direct costs, plus benefits for a total of $21,523. Unexcused absences were considered a loss of productivity and costed at the standard rate. Elaborate equations have been developed to include managerial and supervisory time in computing costs due to sick absences (Cascio, 1987). For this report, however, economic losses due to sick days were considered double jeopardy to UP&L, because the employee was paid sick benefits and productivity was also lost. Therefore, costs were doubled resulting in an expense to UP&L of $45,323.

2. Vehicle Accidents

A company mean cost per vehicle accident for 1986 and 1987 has not been established; however, the mean identified from accidents in our four groups was $2,465. When multiplied by the 52.8 mean vehicle accidents reduction in 1986, the savings to UP&L was $130,152. Multiplying same mean cost per vehicle accident by the 61.2 accident reduction for 1987 from 1985 resulted in a savings of $150,858.

3. Medical Benefits

A further potential savings to Utah Power & Light would result from the reduction of G2's use of medical benefits, $212 per employee per year more than their control group. Rehabilitation of this group would save UP&L $5,724 annually.

4. Turnover

A final and extremely important item in analyzing the cost effectiveness of the program is related to turnover. Estimates of the cost of employee turnover to an organization vary considerably, from $13,500 to $418,500 per employee depending on the individual's job status with the company (Cascio, 1987). The lower figure reflects replacement of a blue collar worker, while the larger is an estimate for replacing a sales manager. Since the majority of UP&L drug positives were in Job Classification 1, we have assigned the conservative figure of $50,000 for turnover replacement per employee. It is beyond the scope of this paper to do an in-depth study of drug-related turnover, however, we assumed the six prospective Utility employees who tested positive in preemployment screening were "high risk" and likely to be terminated for drug abuse or to leave voluntarily. The savings to UP&L by not hiring these applicants was $300,000.

CONCLUSIONS

Demographically, an employee with an admitted or detected drug abuse problem at UP&L had a 75 percent likelihood of being male. The individual was further characterized by having a mean age in the range of 32 to 37 and worked as a laborer, operator or craftsman. He had been employed at UP&L for 7 to 13 years, but commanded a salary less than the UP&L mean. His drug of choice, as detected in 27 of 28 positives was marijuana.

Drug users at UP&L abused absenteeism benefits. G1 used approximately 8 days more than their control and G2 6 days greater than CG2. Conclusions from the absenteeism analysis of groups vs. controls were that G1 individuals use 19.5 more hours of sick leave per year than their corresponding control groups. Vacation hours were similar. Unexcused absences showed a mean difference of 45.1 hours per year. Statistical analysis determined that sick benefits use and unexcused absence use were significantly different. A comparison of the same parameters in G2 and CG2, found that G2 used approximately 25.4 more sick hours and 22.1 more hours in unexcused absences. The total excess hours used was 47.5 which is a statistically significant variation from the frequency matched control group. The conclusions from these data are that drug and alcohol users have greater uses of employee benefits. The abuse from absenteeism alone cost UP&L over $75,000.

While medical injury accidents were reduced, the expenditures for medical benefits showed no clear pattern to distinguished groups and controls. UP&L expenditures on G1 for medical benefits were less than CG1. Expenditures on G2 employees were greater than CG2. Information on the costs of medical expenditures by UP&L insurance benefits was somewhat less conclusive. UP&L actually spent $215 per employee per year less on the drug abusers in health insurance benefits than on the control group. Conversely, the drug rehabilitation group used $212 more in medical benefits annually per employee than their corresponding control group. The number of lost work days from medical accidents and the rate of lost days per 200,000 hours worked, showed increases over the previous 3 years in 1985,1986, and 1987. This phenomenon was partially explained by a change in the record keeping procedures and by the lost days awaiting drug testing results post accident. Perhaps the best indicators of the trends in medically-related accidents were the medical and first aid reported injuries; these demonstrate a dramatic decrease from the peak in 1985 through the last 2 years. Once again these data should be interpreted cautiously when drawing a causal relationship between drug testing and the decreasing injury frequency because numerous external factors not controlled for in our study may affect accident frequencies. Examples include training, changes in job type, experience, and changes in equipment used to perform high risk or dangerous tasks.

Vehicle accident and medical injury accident data were used to draw inferences about the deterrent effect and efficacy of testing. There has been a continuing decrease in the number of vehicle accidents and mean number of vehicle accidents per month over the last 2 years. Not only does the graph demonstrate the changes, but a statistical evaluation comparing 1985 to 1986 and 1987 show that statistically a change has occurred in the number and frequency ofvehicle accidents at UP&L. The detected drug users of G1 were five times more likely to have an on the job vehicle accident than CG1. Vehicle accident frequencies demonstrated a decreasing trend following the onset of drug testing. Reductions in the number of on the job vehicle accidents have saved UP&L $281,000. Caution is advised in concluding that the observed trend was associated with the deterrent effect of drug screening because a number of uncontrolled external factors such as driving experience, changes in driving patterns, improved weather conditions, or improved vehicle safety features could contribute to this decrease. The fact remains, however, that vehicle accidents have decreased over the last 2 years since the inception of the substance abuse management program.

The final aspect of the study was to evaluate the cost effectiveness of the program. Substantiated costs due to accounting or estimates of the cost for initiation and implementation of the UP&L drug screening program total $482,327. Estimates of potential savings to Utah Power & Light total $362,140 without including the estimate of turnover in personnel. With this estimate, the savings were $662,140. When evaluating these data, it must be remembered that these are estimates and they assume that all vehicle accident reduction was based on the deterrent effect of the drugscreeningprogram. This has not been established. However, in defense of the estimates, estimates of unexcused absences and sick leave costs were conservative. The $75,406 expenditure related to these two abuses of the employee benefits system also reflects a potential ongoing annual savings. The net present value of cash flows of $75,406 per year for a time horizon of 10 years at a cost of capital of 15 percent is $378,455, nearly equivalent to the initial cash outlay for establishment of the program.

Costs attributable to absenteeism at UP&L clearly demonstrate that drug abusers pose a potentially significant financial liability to UP&L. Medical expenditures for these individuals are somewhat mixed and do not show clear cost patterns. The current health insurance policy, which limits payments for psychiatric benefits, has resulted in a significant savings to UP&L as demonstrated by G2 expenditures.

The cost estimate data presented show that initiation of the program was expensive. Many of the costs were one-time start-up expenses and will not be incurred again, so that actual operatingexpenses per year will be approximately $218,713.

Drugtesting has been cost effective at UP&L. Elimination of preemployment drug positives potentially saved UP&L $150,000 per year in the first 2 years of the program. Reduction of absenteeism by drug using employees to control levels would save UP&L over $75,000 annually. Vehicle accident reductions have already reduced expenditures $281,000.

From a financial perspective, if the project is evaluated as a capital budget decision, the initial cash outlay was $60,000, while annual cash flows to operate the program were $211,000. Potential or positive cash flows from drug testing without turnover estimates were $180,000, $30,000 less then the negative cash flows. With turnover estimates, savings were $362,140 annually. This figure is $151,140 greater than operating expenses. The pay back period for the initial investment was less than 5 months and the discounted pay back period at an 8 percent cost of capital was also less than 5 months. The net present value of the program at 8 percent with a 5-year time horizon was over $544,000, and on a 10-year time horizon, over $996,000, making this the program a sound financial decision. This, with the added feature of reducing the employee turnover rate by preemployment screening, as a mechanism of removing drug abusers from UP&L pool, certainly shows strong justification for continuing the program in its present form.

ENDNOTE

[1] This study represents a preliminary evaluation of the UP&L program. Although the N in the positive and rehabilitation groups is small, case control-demographically matched control groups were established to match the populations studied and to statistically validate findings. It was the intent of the authors to present a working model for occupational drug testing efficacy studies, and where empirical data concerning the effecte of drug testing were not available, to observe trends in safety indicators.

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An Evaluation of Drug Testing in the Workplace

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INTRODUCTION

In 1987, the National Institute on Drug Abuse (NIDA) sponsored a 2-year study to "Evaluate Drug Testing in the Workplace." This study is being conducted by Southern Electric International, Inc. (SEI) and Integrated Systems and Applied Technologies, Inc. (ISAT).

SEI is the marketing, research, and consulting arm of the Southern Company, which is the parent firm of one of the Nation's largest investor-owned electric utility groups, more commonly known as the Southern Electric System. Alabama Power, Georgia Power, Gulf Power, Mississippi Power, and Savannah Electric Power comprise the operating companies of the group, while SEI, Southern Company Services, and Southern Investment Group are also part of the system. Combined, the group supports 31,700 employees, $18.1 billion in total assets, and a large and diverse work force ofinservice employees. The group processes more than 10,000 applicants a year, has hired more than 2,000 new employees a year, and enjoys the benefits of many thousands of additional contract employees engaged in a wide array of work ranging from the construction of nuclear power plants to the provision of an Employee Assistance Program (EAP).

ISAT is a management consulting firm which specializes in research on and evaluation of health systems and human factors engineering. It provides services to a wide array of clients in the public sector (Federal, State, and local governments) and the private sector (corporations and universities).

The purpose of this study is to investigate a series of issues surrounding drug use and drug testing in the workplace. Of primary interest is the identification and validation of workplace behaviors that are a clear indication of drug use. With the identification of useful indicators, investigations will also be conducted into other areas, such as estimating drug use prevalence in the workplace, evaluating a drug testing program, and estimating and comparing the costs and benefits of a drug testing program. To perform these investigations, large volumes of data are needed on a company's environment and work force, and, where possible, drug test results on a sample of employees. To provide these data, SEI obtained permission to access the rich variety of data files at Georgia Power. These files contain information describing drug test results and participation in an EAP. Georgia Power has had a program with several components— drug education, supervisor training, drug testing, and an EAP- since 1982. This paper describes Georgia Power's program, discusses the studies to be performed in the NIDA-sponsored project, and presents some preliminary results obtained from Georgia Power's data files.

DESCRIPTION OF THE GEORGIA POWER PROGRAM

The history of Georgia Power's drug testing program dates back to 1972, when Edwin I. Hatch, then president of the company, sent a letter to all employees establishing a policy of no drug use on company time or property. During the next decade, the company continued its efforts to assess the impact of drug use in its work force and estimate its impact on performance and productivity. The Georgia Power company program for preventing alcohol and drug use consists of several activities, including an education and communication component, security activities, an EAP, and drug testing.

The education and communication component involves employee education and participation, supervisory training, continuing publicity, and notice to contractors. Initially, 177 employee education sessions were held at all major work locations. In addition, 53 training sessions were held to instruct supervisors in applying the policy and recognizing aberrant behavior and drug usage. The Security Department trained selected managers to identify and handle contraband.

A number of continuing education and communication efforts have been undertaken. At management's request, followup training has been provided on-site and is included in all Labor Relations classes. Continuing publicity activities—including newsletters, bulletin boards, and the company's monthly magazine—have reinforced the program. At one of the nuclear sites, a drug information hotline has been established to encourage employees to provide anonymous information about suspected drug usage.

As the final aspect of the education and communications component, all primary contractors and suppliers on major construction sites have been informed that their employees will be held to the same standard as Georgia Power employees. The alcohol and drug policy has been incorporated into general contractor specifications and has become part of the bid package for work on these projects.

Security activities include the use of drug-detecting dog searches. These searches are made at the request of division management. Before a new location joins the program, a live demonstration and information meeting is held for all employees. The company also uses the investigations section staff in the Security Department who conduct both undercover investigations and open investigations as followup to specific allegations. These activities are always coordinated with local law enforcement, and the appropriate authorities are notified whenever violations of the law come to management's attention.

Georgia Power sponsors an EAP as an integral part of the program. The EAP provides free counseling and referral services to employees, retirees, and their immediate families. The service is voluntary, confidential, and available through a statewide network at 14 locations. Employees are encouraged to seek assistance for an alcohol or drug problem before it comes to management's attention. Once a supervisor initiates an investigation into an employee's involvement with alcohol or drugs, the employee may not use the EAP as a shield against discipline. The EAP is promoted regularly through mailings to employees' homes, information board articles, and other media.

The final component of Georgia Power's program is the ongoing process of drug testing. A network of company physicians is used to collect urine or blood specimens. A central laboratory analyzes specimens for all major drugs with abuse potential. Positive findings are confirmed at least once, using Gas Chromatography/Mass Spectrometry. Partial specimens are retained at the physician's offices in case employee files a challenge.

Pre-employment testing is conducted as part of the pre-employment physical on all prospective employees, including summer and part-time employees. No exceptions are permitted. Individuals who fail the test are ineligible to re-apply for 6 months. Upon initial job application, all applicants are immediately put on notice that they must pass a preemployment physical, which includes a drug screening test, conducted by a company designated physician.

Drug testing may also be required to prove fitness for duty. Such testing may be triggered by aberrant behavior observed by a supervisor or by other causes, (e.g., off-duty arrest or reliable information from a co-employee or customer). Refusing to submit to the test is considered insubordination and carries a uniform discipline of discharge. In addition, at management's discretion, an employee may be required to submit to a test to help determine the cause of an accident.

Finally, two employee groups-nuclear plant and the security personnel-must submit to special drug testing procedures in addition to pre-employment and fitness for duty tests. Specifically, all employees who are badged for unescorted access to Plant Hatch or Plant Vogtle must take a drug test as part of the clearance process, most often initiated when an employee transfers to a nuclear plant. Due to its remote location, Plant Vogtle conducts on-site prescreening using EMIT equip ment. All positives are then retested off site. Security department employees are also required to submit to drug testing as part of annual physical examinations.

NIDA-SPONSORED RESEARCH PROGRAM

Four types of studies are being performed using the range of data sets available at Georgia Power. Specifically, SEI/SAT plans to: (1) identify the workplace behaviors and measures that are associated with drug use, (2) evaluate the impact of drug testing, (3) develop estimates of drug use prevalence in the Georgia Power work force, and (4) study the costs and benefits of drug testing. This research will be conducted using analytic databases constructed by manipulating and concatenating the various data files available through Georgia Power. The database development and the four studies are described in the following sections.

Database Development

Creation of a single integrated database is critical in conducting all four analytical studies. This database will be constructed by manipulating and joining the various automated and manual data sets available from Georgia Power and affiliated organizations. The original data sets available for database development describe the approximately 15,000 Georgia Power employees and comprise the following:

- The cumulative administrative file (e.g., demographic data, workplace-related administrative data)
- Employment history file (e.g., promotion demotions, transfers, pay increases and reductions
- Payroll deduction files (e.g., participation in savings plans, garnishments)
- Insurance files (type of insurance held)
- Education files (education history)
- Job classification file (job structure of the work force)
- Dependent file (demographic characteristics of the employees' dependents)
- Pay history file (seven types of absenteeism by 2-week pay periods)
- Previous employment history file (job history prior to employment at Georgia Power)
- Human resources file (e.g., performance evaluation for non-union employees, merit increases)
- Accident file (e.g., accidents per individual by type, severity, date injury)
- EAP admissions file (EAP participation by type of problem: 30 percent automated; 70 percent hardcopy)
- Drug test results tile (results of applicant and in-service employee tests: 100 percent hardcopy)
- Health insurance file (claims and payments, by type, for employees and dependents: automated in 1985, hardcopy for earlier years).

The Georgia Power drug testing program has been in place since 1983, with the EAP accepting admissions since early 1982. Thus, data are available for development of the analytic database for the 5-year period from 1983 to 1987. The primary subject for the database is the problem employee. Such employees include not only persons identified as drug users, but also those who appear to have problems as identified by the various data files. This set of individuals comprises the following:

- Inservice employees who tested positive for drug use

- Inservice employees who were tested for cause and tested negative

- Employees who entered the EAP for drug and alcohol problems

- Employees who entered the EAP for other problems

- Employees who were discharged for problems other than drug and alcohol use.

These classes of employees will be compared and contrasted to identify, if possible, factors related to drug use alone. To complete the database, the five classes described above will be augmented by matching these individuals against employees who are not identified with any problem. This set ofnonproblem employees will be taken from the remaining work force and matched, as completely as possible, on job classification, length of employment, sex, race, and age. An episode data item (i.e., test date, EAP entry date, or discharge date) will be identified for each problem employee, and his or her behaviors in the year preceding that date will be considered the measures included in the database. The behaviors of a matched nonproblem partner will be studied for the same 1-year period. A database constructed in this manner will have the same period of exposure for all members of the sample used; it will permit an examination of behavior preceding the critical events for problem employees and nonproblem matched partners. This preliminary database will probably number approximately 5,000 employees. Other extended databases will be constructed as needed.

A Comparison Study to Identity Indicators of Drug Use in the Workplace

Substance abuse in the workplace is frequently viewed as a hidden behavior, indirectly manifested by a range of associated, abnormal behaviors. For example, it has often been stated that substance-abusing employees have a higher level of absenteeism, utilize more health care resources, and are involved in more accidents than nonsubstance-abusing employees. Moreover, it is believed that substance abusers experience dysfunctional behavior in other areas, such as interpersonal skills, financial stability, marital relationships, job performance, and associations with law enforcement agencies. While these relationships have been postulated, they have been largely unsubstantiated by data from the workplace. It is therefore not clear whether or not such relationships exist, much less if ancillary measures (e.g., absenteeism) are necessary or sufficient conditions for estimating substance abuse. Using the database developed in this project, analytic results can be generated to support or deny the assertions put forth about the symptomatic behaviors related to the substance abuse in the workplace.

Evaluation of a Drug Testing Program in the Context of Other Programs Aimed at Reducing Substance Abuse (EAP and the Indicators of Substance Abuse at Georgia Power)

This study will involve a trend analysis of the measures identified as substance abuse indicators at Georgia Power. These measures will be identified through the analyses conducted in the comparison study described above.

In analyzing trends, it must be recognized that substance abuse indicators can be subject to the confounding influence of other internal programs at Georgia Power. To identify potential sources ofconfounding influence, Georgia Power records will be searched to uncover programs which may have influenced measures chosen as substance use indicators. Since the analysis period will cover the years 1978-1987, attempts to identify confounding influences will also cover that period. The initiation date and intensity (if possible) of such program influences will be charted against the values of the indicators across the period of analysis. The analysis will then attempt to estimate the effect of drug testing on the indicators by separating out, where possible, the effects of other programs.

Prevalence Modeling Based on Drug Tests and EAP Data

Using various Georgia Power databases, attempts will be made to develop models that estimate the overall prevalence of substance abuse. Development of these models will be based largely upon work performed in estimating the size of hidden populations (e.g., nonreported medical problems, undetected infection rates, the number of unserved individuals with disabilities, and drug use in the general population). The size of hidden populations (i.e, unobserved substance abusers) is estimated by modeling overt aspects of the problem and extrapolating the size of the nonovert, or unobserved, portion of the target population.

Study of the Cost-Benefit of Drug Testing

A cost-benefit study of drug testing will be conducted to estimate savings (benefits) ascribable to the impact of testing versus the cost of performing the program. Costs associated with program performance are readily apparent, yet estimates of the benefits are a more complex endeavor. Benefits can be measured on a continuum ranging from the actual reduction in drug use and its associated dysfunctional behavior to the hedonic values estimated by the work force as a result of their perception of working in a safer and healthier environment. Development of bases for benefit measurement will depend upon the results of the baseline, the prevalence study, and the evaluation of the drug testing policy. These will identify which measures (i.e., behaviors) are associated with drug use, the effects on these measures, and permit an estimate of the reduction in drug use. Hedonic measures, if they are admissible, can be measured through attitude assessment on employee surveys.

This cost-benefit study will then assemble a list of cost and benefit elements. Analysis will proceed by assigning dollar values to the units (i.e., days not absent) of the acceptable elements. The number of units to be included will be estimated from available results. Given the possible nontechnical controversy associated with the elements in the analysis, sensitivity analysis will be performed to identify the range of values the cost-benefit ratio could take.

PRELIMINARY DATA ANALYSIS

Background

The presentation of preliminary results has been taken from the 1986 and 1987 Georgia Power data and focuses on examining potential indicators of drug use in the workplace. Useful indicators of drug use are identified as having the ability to differentiate behaviorally between individuals who use drugs and those who do not, even if they have other problems which may also cause aberrant behavior. In this sense, the focus has been on measuring the extent of the drug use problem as opposed to identifying extreme behavior, per se.

In identifying unconfounded indicators, preliminary analysis followed the path of comparing and contrasting measures found in various data files associated with Georgia Power employees. The initial phase of this preliminary analysis identified individuals with positive and negative drug test results as the reference groups. In later phases, EAP participation and employees discharged for various reasons will be used as target and comparison groups. The present analysis was restricted to employees tested for drug use.

Population parameters of the studied behaviors were used as comparison bases. Relevant statistics were calculated, including population and behaviorial parameters, for both the positive and negative drug tested groups.

Methodology

Relevant background variables and distributional characteristics of the indicators were then chosen and analyzed. A complete analysis of the data would require a selection of variables based on a comprehensive statistical analysis. For presentation of preliminary results, background variables were chosen based on the assumption that some variables are more important than others in the description of a work force.

For this presentation three variables were selected: job classification, year hired, and age. The variable, "year hired," was dichotomized in one category of being hired before 1983 and another identifying those hired in 1983 or later. This categorization was constructed because both applicant and inservice testing for cause was implemented in 1983. This variable would, therefore, give some indication of the impact of the testing program on the indicators.We was chosen as a background variable because it is often related to drug use.

The next aspect of the methodological development was to select comparison indicators and examine their probability distributions. Distributions were examined so that appropriate models could be identified for specific tests. The purpose of the preliminary analysis was to determine if it is possible to discriminate, using indicator measures, between those who tested positive, those who tested negative, and the total work force. Therefore, it was desirable to use the most sensitive tests possible. Choosing the underlying theoretical probability models that best fit the data was essential to identifying the appropriate, derived tests.

Several indicators were selected to perform the comparisons. This selection was based on measures that had been clearly incorporated into the databases. The measures selected for examination were:

- Number of promotions per individual
- Number of demotions per individual
- Participation in an automatic savings plan
- Number of different jobs an individual has held
- Total hours per year absent for illness or non-occupational injury
- Total hours per year absent as unauthorized absence.

Multiple comparisons were made based on the average behavior of the measures in the total work force. The sample means of those who tested negative, positive, and positive for THC were to be compared to the population mean. To determine if discrimination existed between those who tested negative and positive, additional tests were conducted for each measure, between all who tested negative and all who tested positive, and between all negatives and positives for THC. The tests to be used will be based on the configuration of the data.

Results

Descriptive results are shown in Tables 1,2, and 3. Table 1 reflects the size of the total work force for 1986 and 1987 used in this preliminary analysis, the number tested in each year, the percent positive for any drug, and the percent positive for each specific drug. Of the total work force, 463 and 366 were tested in 1986 and 1987, respectively. In 1986, 13.4 percent of those tested were found to be positive for any drug, while in 1987, the percentage was 14.8. In the 2 years, 4.8 and 5.2 percent tested positive for THC, 2.2 and 1.6 percent were positive for cocaine, and 6.5 and 7.9 percent tested positive for other drugs in 1986 and 1987, respectively.

The results of testing in relation to the work force characteristics explained above are given in Tables 2 and 3. Table 2 gives the 1986 testing results. The percentage distribution of employees within the three characteristics is displayed in the first column on the left. In relation to job classification, the distribution of tests is somewhat out of proportion with the entire work force. The largest degree of disproportionality is in relation to semiskilled labor—46.9 percent of the tests versus 24.6 percent of the work force. The disproportional tests occur because this job class contains security personnel who are routinely tested. In

Table 1. The Study Population Summary Findings

	1986	1987
Workforce Total	17,244	17,445
Total Number Tested for Drug Use	463	366
Total Positive	13.4% (62)	14.8% (54)
THC Positive	4.8% (22)	5.2% (19)
Cocaine Positive	2.2% (10)	1.6% (6)
Other Drugs Positive	6.5% (30)	7.9% (29)

subsequent analyses, these individuals will be largely removed. However, while the tests are taken disproportionately relative to job classification, the results do show that virtually all classes are being tested—from managers to unskilled labor.

Disproportionate testing also occurs relative to the categories of year hired and age. Those hired in 1983 or later are tested at a higher rate than their representation in the work force (32.4 percent tested versus 17.2 percent in the work force). This higher rate of testing may reflect the age structure of those hired before 1983. This assertion is partially substantiated by the test distribution relative to age, where the 21-to-30 age category is tested at a somewhat higher rate. But, among the age groups, those older than 50 years of age are also tested proportionally higher than their size in the entire work force.

The third column (tested positive) presents the percentage of those in each work force characteristic category who test positive for any drug. That is, these percentages are conditional on the number tested in each category and are, in effect, row percentages. In relation to the job classification, the highest positive rates are among technicians (38.9 percent) and skilled labor (25.0 percent). This may mean that drug use is greater in those categories or that it is easier to detect drug-related aberrant behavior among these groups. Given the type of jobs involved,

Table 2. Drug Test Results by Workforce Characteristics in 1986

	Entire Workforce (17,244)	Tested Employees (463)		Tested Positive (62)*		THC Positive (22)*	
	%	%	(N)	%	(N)	%	(N)
Job Classification							
Managers	16.5% :	14.9%	(69)	5.8%	(4)	2.9%	(2)
Professionals	16.9% :	12.5%	(58)	13.8%	(8)	5.2%	(3)
Technicians	8.0% :	3.9%	(18)	38.9%	(7)	16.6%	(3)
Sales	0.3% :	0.0%	(0)	0.0%	(0)	0.0%	(0)
Clerical	13.7% :	8.4%	(39)	10.3%	(4)	0.0%	(0)
Skilled Labor	24.6% :	13.0%	(60)	25.0%	(15)	11.7%	(7)
Semi-Skilled Labor	18.4% :	46.9%	(217)	11.1%	(24)	3.2%	(7)
UnskilledLab	1.3% :	0.4%	(2)	0.0%	(0)	0.0%	(0)
Service	0.3% :	0.0%	(0)	0.0%	(0)	0.0%	(0)
Totals	100.0%	100.0%		n/a		n/a	
Year Hired							
Before 1983	82.8% :	67.6%	(313)	11.8%	(37)	4.8%	(15)
1983 and After	17.2% :	32.4%	(150)	16.7%	(25)	4.7%	(7)
Totals	100.0%	100.0%		n/a		n/a	
Age							
Under 21	1.0% :	0.4%	(2)	50.0%	(1)	0.0%	(0)
21-30	25.7% :	33.3%	(154)	16.2%	(25)	5.3%	(9)
31-40	45.9% :	36.1%	(167)	16.2%	(27)	6.6%	(11)
41-50	13.9% :	17.9%	(83)	8.4%	(7)	2.4%	(2)
Over 50	8.5% :	12.3%	(57)	3.5%	(2)	0.0%	(0)
Totals	100.0%	100.0%		n/a		n/a	

*The percent column (%) represents the total proportion of individuals who were found to he positive for drug use either in general or THC specifically.

the latter explanation seems more viable, and testing for cause has a better hit rate when the job involves skilled behavior.

In relation to age, the rates of positive tests are as expected, while relative to year hired, the rates of positive tests are rather notable. The results relative to year hired categories are interesting because the higher rate of positive tests is among those hired in 1983 and later. These individuals were hired when an applicant testing program was in effect. It is unclear how to interpret this result. From one standpoint, applicant testing is not as effective as desirable. Conversely, these individuals are probably a younger group and, therefore, more susceptible to drug use. This latter argument could also point out the possibility that the positive rate could even be higher if the applicant testing program were not in place. The results in the age categories would tend to partially support the second argument. In any event, this is an area which will need further exploration.

The positive test results relative to THC are similar in configuration, if not in degree, to those for all drugs combined. Technicians and skilled labor have higher rates of usages (18.2 percent and 10.6 percent, respectively), and the age groups from 21 to 40 have higher rates. The exception is seen in relation to year hired. Here, the rate of THC usage among those tested is virtually the same. One would hope that there would be a lower rate among those hired in 1983 or later because of the applicant testing program. The same discussion of results, given earlier, could also be applied here.

The results in Table 3 are of the same type as those in Table 2, but for 1987. There are some similarities with 1986 along with some differences. The distribution of tests relative to workplace characteristics is very similar in spread and disproportionality. Positive results for all drugs relative to age groups are somewhat higher (10.4 percent for the 41 to 50 age group, and 11.4 percent for the over 50 age group). Positive test results for THC relative to job classification and age are similar to 1986. Technicians and skilled labor have the highest THC-positive rates (18.2 percent and 10.6 percent, respectively), and the 21-to-30 and the 31-to-40 age groups have the higher rates (6.4 percent and 7.8 percent, respectively).

Differences between 1986 and 1987 appear in relation to positive results for all drugs within job classification and year hired, and for THC by year hired. In the job classification categories, unskilled labor has the highest rate of positive results for all drugs combined. In 1986, technicians had that distinction. Relative to year hired, in 1987 the positive rate for all drugs is lower for those hired in 1983 and later (13.2 percent) versus those hired before 1983. In this year, the THC positive rate is also lower (2.6 percent), whereas in 1986 it was the same as between the two year-hired groups. At this stage of analysis, there seems to be some year-to-year variation either in the results or strategies for selecting those to be tested, or in the behaviors provoking the use of test. This area also needs further investigation.

Table 4 gives the results for 1986 relative to savings plan participation, promotions, demotions, and jobs held per year. These results are given in aggregate form not differentiated by workplace characteristics. The interesting finding in this Table is clearly that the savings plan partici-

Table 3. Drug Test Results by Workforce Characteristics in 1987

	Entire Workforce (17,455)	Tested Employees (366)		Tested Positive (54)*		THC Positive (19)*	
	%	%	(N)	%	(N)	%	(N)
Job Classification							
Managers	16.3% :	14.2%	(52)	7.7%	(4)	1.9%	(1)
Professionals	17.1% :	10.9%	(40)	17.5%	(7)	2.5%	(1)
Technicians	7.6% :	3.0%	(11)	18.2%	(2)	18.2%	(2)
Sales	0.3% :	0.0%	(0)	0.0%	(0)	0.0%	(0)
Clerical	13.5% :	6.0%	(22)	13.6%	(3)	0.0%	(0)
Skilled Labor	24.0% :	12.8%	(47)	21.3%	(10)	10.6%	(5)
Semi-Skilled Labor	18.5% :	48.4%	(177)	12.4%	(22)	5.1%	(9)
Unskilled Labor	2.5% :	4.4%	(16)	31.3%	(5)	6.3%	(1)
Service	0.2% :	0.3%	(1)	100.0%	(1)	0.0%	(0)
Totals	100.0%	100.0%		n/a		n/a	
Year Hired							
Before 1983	80.0% :	68.9%	(252)	15.5%	(39)	6.3%	(16)
1983 and After	20.0% :	31.1%	(114)	13.2%	(15)	2.6%	(3)
Totals	100.0%	100.0%		n/a		n/a	
Age							
Under 21	0.9% :	1.1%	(4)	0.0%	(0)	0.0%	(0)
21-30	23.1% :	29.8%	(109)	15.6%	(17)	6.4%	(7)
31-40	45.8% :	38.8%	(142)	17.6%	(25)	7.0%	(10)
41-50	20.9% :	18.3%	(67)	10.4%	(7)	1.5%	(1)
Over 50	9.3% :	12.0%	(44)	11.4%	(5)	2.3%	(1)
Totals	100.0%	100.0%		n/a		n/a	

*The percent column (%) represents the total proportion of individuals who were found to be positive for drug use either in general or THC specifically.

pation differentiates drug users from the total work force and from those who were tested with negative results. Employees with negative results may have exhibited aberrant behavior to provoke a test, but the rate of participation in a savings plan was essentially the same as the total work force (64.8 percent versus 66.4 percent). Employees who tested positive for any drug, and for THC in particular, had significantly lower participation rates (41.9 percent and 40.9 percent, respectively). Promotions and demotions did not significantly differentiate drug users from the total work force. The rate of demotions for those who tested negative was significantly higher than for the total work force rate (.055 versus .019). Although these individuals also had a higher rate of demotions than those who tested positive (.055 versus .032 and .000), this could be an

Table 4. Job Related Characteristics by Drug Test Results in 1986

	Entire Workforce (17,244)	Employees Testing Negative (401)	Employees Testing Positive (62)	Employees Testing Positive For THC (22)
Participation in Automatic Savings Plan	66.4%	64.8%	41.9% *	40.9% *
Promotions Per Individual	0.171	0.262	0.215	0.200
Demotions Per Individual	0.019	0.055*	0.032	0.000
Job Per Year Per Individual	0.289	0.332	0.571*	0.340

* Significant at the 0.06 level.

artifact of having aberrant behavior and staying in the work force; those who test positive are discharged and have no opportunity to be demoted. Jobs held per year significantly discriminated between those who tested positive for any drug from the total work force and from those who tested negative (.571 versus .289 and .332). Those testing positive for THC do not have a job-change rate that is significantly different from the work force in general or from those who test negative.

The results shown in Table 5 are for the same measures as in Table 4, but generated by 1987 data. The patterns of significance in Table 5 are similar to those for 1986. Participation in a savings plan is significantly lower for those who test positive (44.4 percent for all drugs combined, and 36.8 percent for THC). For demotions, those who tested negative are significantly higher than the work force as a whole at the .10 level (.051 versus .015); although THC positives have a higher demotion rate in this year (.083), the rate is not significant due to the small sample size (22). In 1987, the number of jobs held per year by positives (all drugs combined) is significantly larger than the total work force value (.375

Table 5. Job Related Characteristics by Drug Test Results in 1987

	Entire Workforce (17,445)	Employees Testing Negative (312)	Employees Testing Positive (54)	Employees Testing Positive for THC (19)
Participation in Automatic Savings Plan	59.8%	60.6%	44.4% *	36.8% *
Promotions Per Individual	0.122	0.149	0.129	0.210
Demotions Per Individual	0.015	0.051 **	0.029	0.083
Jobs Per Year Per Individual	0.264	0.314 *	0.375 *	0.319

* Significant at the 0.06 level.
** Significant at the 0.10 level.

versus .264). However, this does not discriminate this group from those who tested negative (also significantly larger than the total work force rate at .314) Those who test positive for THC also had a higher rate (.319), but it was not significant due to the small sample size (19).

The results for total yearly hours absent for sickness and non-occupational injury are given in Table 6 (1986) and Table 7 (1987). These results are particularly interesting. When examining the totals for those tested in 1986, this measure does not discriminate positives from negatives. While both those who test negative and those who test positive for any drug have this type of absenteeism at a significantly higher volume than the work force average (36.7 and 41.2 hours versus 28.5 hours), the two groups are not significantly different from each other. Those testing positive for THC have a lower volume ofabsenteeism than the total work force, although it is not significantly lower.

The fascinating aspect of this measure, as shown in Table 6, is the configuration of the results when examined in the subgroups defined by work force characteristics. While the overall results do not discriminate between negatives and positives, discrimination is present in some subgroups. This suggests that useful findings may be found in the deep structure of the data. For example, relative to job classification, discrimination occurs in several ways, both useful and not. For managers and semiskilled labor only, those who tested positive (for any drug) have significantly higher amounts of this absenteeism (63.9 versus 21.6 hours and 42.7 versus 31.6 hours). Negatives are absent this way for essentially the same amount of time as the total work force. Here discrimina-

Table 6. Absenteeism in Hours for Workforce Characteristics and Drug Test Results in 1986 (1)

	Entire Workforce (17,244)	Employees Testing Negative (401)		Employees Testing Positive (62)		Employees Testing Positive for THC (22)	
	Avg. Hours	Avg. Hours	(N)	Avg. Hours	(N)	Avg. Hours	(N)
Job Classification							
Managers	21.6 :	25.0	(65)	63.9	(4)*	5.0	(2)
Professionals	22.6 :	32.4	(50)*	90.1	(8)**	10.7	(3)
Technicians	18.8 :	24.9	(11)	13.7	(7)	22.0	(3)
Sales	0.0 :	0.0	(0)	0.0	(0)	0.0	(0)
Clerical	35.5 :	48.1	(35)*	20.8	(4)	0.0	(0)
Skilled Labor	35.3 :	38.9	(45)	25.0	(15)	23.9	(7)
Semi-Skilled Labor	31.6 :	37.2	(193)	42.7	(24)*	16.1	(7)
Unskilled Labor	7.6:	297.0	(2)*	0.0	(0)	0.0	(0)
Service	37.6:	0.0	(0)	0.0	(0)	0.0	(0)
Year Hired							
Before 1983	29.7 :	41.4	(276)*	53.3	(37)*	20.3	(15)
1983 and After	22.6 :	26.4	(125)	23.4	(25)	11.9	(7)
Age							
Under 21		43.0	(1)*	0.0	(1)	0.0	(0)
21-30	30.3:	34.7	(129)	18.9	(25)	17.9	(9)
31-40	26:9 :	35.1	(140)*	55.8	(27)**	17.5	(11)
41-50	27.5 :	38.3	(76)*	72.9	(7)**	17.0	(2)
Over 50	35.9 :	43.3	(55)*	32.6	(2)	0.0	(0)
Totals	28.5 :	36.7	(401)*	41.2	(62)*	17.6	(22)

(1) Sickness and Non-Occupational Injury.
* Significant at the 0.05 level.
** Significant (0.05 level) and significantly larger than those with negative results.

tion occurs with a clear significance. We will call this a Type-1 discrimination where positives can be separated from others.

A second type of discrimination occurs relative to professionals (Type-2). While both negatives and positives have significantly more of this absenteeism than the work force mean, those who test positive (for any drug) have a significantly higher amount than negatives (90.1 versus 32.4 versus 22.6 hours). In this group, positives are so extreme as to discriminate themselves from the lesser extreme behavior of negatives.

Discrimination of drug users from others for this measure also occurs when examined in relation to age groups. A Type-2 discrimination exists for the 31-to-40 age group (55.8 versus 35.1 versus 26.9) and the 41-to-50 age group (72.9 versus 38.3 versus 27.5). No discrimination occurs relative to the year hired categories nor for any group relative to THC positive tests.

The patterns of discrimination seen in relation to absence for illness and nonoccupational injury in 1986 (Table 6) do not hold for 198'7 (Table 7) among job classification. For managers, the Type-l discrimination pattern in 1986 converts to a Type-2 in 1987 (177.0 versus 56.1 versus 18.8). Relative to semiskilled labor, a Type-l discrimination in 1986 changes to extreme behavior, but no discrimination, in 1987. Skilled labor, which showed no discrimination on this measure in 1986, revealed a Type-2 discrimination in 1987.

Changes also took place in relation to year hired and age. For those hired before 1983 no discrimination was evident in 1986, but a Type 2 occurred in 1987. In age groups, the 41-to-50 group had a Type-2 pattern in 1986, but no significant differences for either positives or negatives in 1987. Clearly this type of absenteeism measure has an interesting deep structure data pattern for identifying drug users, but it is not consistent across time.

The results of a second type of absenteeism are given in Table 8 for 1986 and Table 9 for 1987 relative to workplace characteristics. This type of absenteeism is called Docked Time, and relates to such things as nonpaid sickness, personal time, and disciplinary suspensions. To some degree, it should be more sensitive to drug use as an indicator. At a first examination, it may be a sensitive indicator but is not a consistent one. For example, when looking at the totals for both years, 1986 shows a Type-2 discrimination for positive results for any drug (83.9 versus 37.8 versus 15.4 hours) and for THC (127.2 hours). This pattern is not repeated in 1987, where this absenteeism has a Type-2 discrimination pattern only for THC positives. While consistency in discrimination for

Table 7. Absenteeism in Hours for Workforce Characteristics and Drug Test Results in 1987 (1)

	Entire Workforce (17,445)	Employees Testing Negative (312)		Employees Testing Positive (54)		Employees Testing Positive for THC (19)	
	Average Hours	Avg. Hours	(N)	Avg. Hours	(N)	Avg. Hours	(N)
Job Classification							
Managers	18.8 :	56.1	(48)*	177.0	(4)**	16.0	(1)
Professionals	22.3 :	21.0	(33)	15.6	(7)	0.0	(1)
Technicians	17.4 :	16.1	(9)	0.0	(2)	0.0	(2)
Sales	0.0 :	0.0	(0)	0.0	(0)	0.0	(0)
Clerical	35.0 :	51.6	(19)*	16.0	(3)	0.0	(0)
Skilled Labor	37.7 :	61.4	(37)*	81.6	(10)**	23.2	(5)
Semi-Skilled Labor	31.3 :	41.2	(155)*	58.9	(22)*	27.7	(9)
Unskilled Labor	6.8 :	38.6	(11)	0.0	(5)	0.0	(1)
Service	21.3:	0.0	(0)	66.5	(1)	0.0	(0)
Year Hired							
Before 1983	28.6 :	49.7	(213)*	68.1	(121)**	18.4	(16)
1983 And After	25.7 :	30.4	(99)	25.9	(15)	28.7	(3)
Age							
Under 21	10.6 :	15.5	(4)	24.6	(17)*	0.0	(0)
21-30	31.7 :	56.6	(92)*	61.7	(25)*	20.7	(7)
31-40	26.9 :	38.2	(117)*	140.9	(7)**	22.0	(10)
41-50	25.5 :	19.8	(60)	19.8	(5)	16.0	(1)
Over 50	31.9 :	68.6	(39)	0.0	(0)	0.0	(1)
Totals	28.1 :	43.6	(314)*	56.4	(54)*	20.1	(19)

(1) Sickness and Non-Occupational Injury
* Significant at the 0.06 level
** Significant (0.05 level) and significantly larger than those with negative results

THC is not present, it does exist in the totals. Therefore, one might expect it to be present in subgroups defined by the work force characteristics.

Discrimination does occur in subgroups, and to a higher degree than it did in relation to the first type of absenteeism. However, it is inconsistent across the 2 years. Relative to job classification, managers have Type-1 discrimination for positive results for any drug in 1986. In 1987, this changes to a Type-2 for both any drug and for THC. Technicians, who have a Type-2 for both any drug and THC in 1986, have no type of discrimination in 1987.

Table 8. Absenteeism in Hours for Workforce Characteristics and Drug Test Results in 1986 (2)

	Entire Workforce (17,244)	Employees Testing Negative (401)		Employees Testing Positive (66)		Employees Testing Positive for THC (22)	
	Average Hours	Avg. Hours	(N)	Avg. Hours	(N)	Avg. Hours	(N)
Job Classification							
Managers	2.9 :	3.6	(65)	20.0	(4)*	0.0	(2)
Professionals	9.5 :	26.3	(50)*	29.3	(8)*	23.3	(3)*
Technicians	63.8 :	107.0	(11)*	372.0	(7)**	682.7	(3)**
Sales	0.0 :	0.0	(0)	0.0	(0)	0.0	(0)
Clerical	18.3 :	38.2	(35)*	51.0	(4)*	0.0	(0)
Skilled Labor	9.9 :	26.4	(45)*	39.9	(15)*	39.6	(7)*
Semi-Skilled Labor	17.6 :	49.7	(193)*	61.7	(24)*	57.6	(7)*
Unskilled Labor	2.3 :	161.8	(2)*	0.0	(0)	0.0	(0)
Service	14.6 :	0.0	(0)	0.0	(0)	0.0	(0)
Year Hired							
Before 1983	11.7 :	26.8	(276)*	55.0	(37)**	44.3	(15)**
1983 And After	33.5 :	62.2	(125)*	126.8	(25)**	305.0	(7)**
Age							
Under 21	78.0 :	3.0	(1)	0.0	(1)	0.0	(1)
21-30	32.1 :	53.9	(129)*	129.5	(25)**	270.7	(9)**
31-40	8.0 :	28.2	(140)*	50.9	(27>**	27.5	(11)*
41-50	8.6 :	31.4	(76)*	80.3	(7)**	30.3	(2)*
Over 50	13.2 :	34.3	(55)*	12.5	(2)	0.0	(0)
Totals	15.4 :	37.3	(401)*	83.9	(62)**	127.2	(22)**

(2) Docked Time: including non-paid sickness, personal time and disciplinary suspensions.
* Significant at the 0.05 level
** Significant (0.06 level) and significantly larger than those with negative results

Similar changes take place across the 2 years in relation to year hired and age. For example, in 1986 there is a Type-2 pattern for both year hired groups relative to any drug positive and THC positive. Discrimination evaporates for those hired in 1983 or later. In relation to the age groups, Type-2 discrimination patterns change almost completely from one year to the next.

CONCLUSION

These preliminary results suggest that the data structure is quite complex. Not only are discrimination patterns different in subgroups of

Table 9. **Absenteeism in Hours for Workforce Characteristics and Drug Test Results in 1987 (2)**

	Entire Workforce (17,445)	Employees Testing Negative (312)		Employees Testing Positive (54)		Employees Testing Positive for THC (19)	
	Average Hours	Avg. Hours	(N)	Avg. Hours	(N)	Avg. Hours	(N)
Job Classification							
Managers	2.0 :	7.5	(48)*	53.3	(4)**	88.0	(1)**
Professionals	10.4 :	52.8	(33)*	16.0	(7)	72.0	(1)*
Technicians	61.1 :	528.1	(9)*	44.0	(2)	88.0	(2)
Sales	0.0 :	0.0	(0)	0.0	(0)	0.0	(0)
Clerical	12.8 :	46.3	(19)*	76.7	(3)	0.0	(0)
Skilled Labor	11.8 :	31.1	(37)*	77.1	(10)**	106.4	(5)**
Semi-Skilled Labor	16.1 :	40.7	(155)*	94.8	(22)**	133.3	(9)**
Unskilled Labor	5.7 :	9.2	(11)	0.0	(5)	0.0	(1)
Service	4.0 :	0.0	(0)	144.8	(1)*	0.0	(0)
Year Hired							
Before 1983	8.6 :	20.6	(213)*	66.1	(39)**	113.4	(16)**
1983 And After	38.8 :	110.2	(99)*	69.2	(15)*	133.2	(3)*
Age							
Under 21	76.9 :	603.0	(4)*	0.0	(0)	0.0	(0)
21-30	32.4 :	78.1	(92)*	81.3	(17)*	125.1	(7)*
31-40	8.5 :	25.1	(117)*	69.5	(25)**	91.0	(10)**
41-50		30.0	(60)*	46.6	(7)*	88.0	(1)**
Over 50	10.5:	24.5	(39)*	32.5	(5)*	0.0	(1)
Totals	14.6 :	49.0	(312)*	66.9	(54)*	98.6	(19)**

(2) Docked Time: including non-paid sickness, personal time and disciplinary suspensions.

* Significant at the 0.05 level

** Significant (0.05 level) and significantly larger than those with negative results

the work force, but they change across time. This indicates that time must be used as a mediating variable in future analyses. In this case, the question to be addressed involves determining whether deep structure results have a pattern across time, or if they are largely random. Deriving meaningful results with these data will require a careful analytic approach in the future work.

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Industry Responses to Drugs in the Workplace

Characteristics of Firms With Drug Testing Programs

Helen Axel
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INTRODUCTION

A clear majority of corporations responding to a 1988 Conference Board survey reported they had, or were in the process of implementing, a drug testing program. The Conference Board is an independent business research organization whose members are primarily medium and large corporations. The level of drug testing activity among corporations in the Board study appears to be consistent with findings from other surveys conducted among similar companies during the same time period.

The study was designed to learn about corporate experiences with drug testing programs and other workplace initiatives for controlling substance abuse. Companies' perceptions and responses to substance abuse problems were addressed in the first half of the survey. The remainder of the survey, not covered in this review, focused on the specifics of drug testing:

- Program administration
- Procedures, test results
- Consequences for employees with positive tests
- Problems encountered
- Assessments of benefits to the company

The survey, conducted among 2,675 large corporations included in the Board's sampling frame, yielded a 25 percent response rate. This paper presents preliminary findings of the survey, and compares characteristics and responses of firms with and without drug testing programs. The complete report, based on a comprehensive analysis of the survey data, interviews with executives in firms with drug testingprograms, a review of policy statements, and other supplementary materials returned with the completed questionnaires, will be issued by The Conference Board in 1989.

SURVEY METHODOLOGY

The nation's largest firms in manufacturing, finance and insurance, construction, utilities, transportation, trade, and other services, constitute the Board's sampling frame. Individual business units of some very large conglomerates, often recently merged corporations, are treated as separate companies in the sample. Sales, assets or deposits, as appropriate, are used as measures of size for determining inclusion in the sampling frame.

Conference Board membership was not one of the criteria used in the sample design. Thus, companies surveyed were not necessarily Conference Board member firms, nor were all Conference Board corporate associates included in the survey. However, considerable overlap undoubtedly exists between the survey sample and The Conference Board's membership, and the degree of familiarity with the Board is likely to have affected the response rate.

Firms were surveyed by mail in February 1988, with a follow-up mailing approximately 6 weeks later. The questionnaires were addressed to the senior, corporate-level human resources officer. If that individual was not known by name, and no other names were available on the Board's mailing lists for an appropriate job title, the survey was directed to a generic job title, "Senior Human Resources Officer."

As in most surveys conducted by The Conference Board, participants were requested to enter the company's name and address on the questionnaire, and provide the name, title and telephone number of the person completing the form. In return, confidentiality was assured by the Board, and no company-specific information would be revealed without prior approval from the participant. Virtually all respondents to Conference Board surveys provide this information, and the current experience was not an exception.

PROFILE OF RESPONDENTS

Response rates varied by industry. They were on a par with the overall rate (25 percent) in the manufacturing, finance and insurance sectors. However, the proportion of respondents was significantly higher among gas and electric utilities, and significantly lower in other industry groups. Respondents tended to reflect The Conference Board's traditional constituencies. Differences in attitudes toward drug abuse problems—and experience in dealing with them—may also have affected a company's interest in participating in the study.

Two out of five companies in the survey are manufacturers, somewhat under a third from financial service firms, one-sixth from utilities, and the remainder from other industry groups. Over half have more than 5,000 U.S.-based employees, and two-fifths have work forces of at least 10,000. (Although nearly half of the survey participants reported their firms have employees outside the United States, most drug-abuse control efforts in U.S.-based, multinational companies are directed only at their domestic work forces.) Respondents are headquartered in all but four of the 50 States, with the greatest concentration in the industrial North Central States and somewhat fewer in the Northeast and South.

FIRMS WITH AND WITHOUT DRUG TESTING PROGRAMS COMPARED

Just under half the companies studied have active drug testing programs for applicants and/or employees. Another 6 percent indicated plans were currently under way to implement such a program. The majority of non-testing firms had either considered and rejected the idea, or had no plans to investigate drug testing. Although "about-to-implement" companies could also be grouped with those now testing, this comparative analysis defines testing and non-testing companies according to their experiences at the time of the survey.

Some cautionary notes: This paper looks at corporate response to substance abuse through only one lens, drug testing. Thus, while this review makes some broad observations about characteristics and conditions in companies that utilize drug testing, it may overstate some of the differences that exist between firms that test and those that do not. Drug testing is a new experience for most employers—well over two fifths of the programs described by survey respondents were less than 2 years old. The presence of other initiatives, such as employee assistance programs, may provide the motivation for employers to deal with workplace substance abuse. In addition, drug testing itself is a multi-dimensional program that, in different companies, may involve different categories of employees, job applicants—or both. For example, for many employers, drug testing is an "externalized" program, confined to the preemployment process, and does not involve active employees. The characteristics of firms that only test applicants may differ substantially from companies that also include various forms of employee drug testing.

Industry and Workforce Profiles

The survey found that 75 percent of the firms conductingdrugtestingare manufacturers or utilities, while close to half the companies without these programs are in banking, insurance or other financial services. Put another way, in most industry categories, drug testing is the rule; the principal exception being the financial services sector, where only 13 percent of the companies have drug testing programs.

It is not surprising that industries conducting drug testing also tend to be male-intensive and include a higher proportion of workers in skilled crafts, production and laborer categories. Unions, too, are far more likely to be present in the drug testing firms. By contrast, again probably because of the industry breakout, a majority of non-testing firms have female- intensive work forces, a high percentage of employees in clerical jobs, and relatively little unionization.

It also appears that companies conducting drug testinghave large labor forces located in multiple sites. The higher incidence of drug testing is not surprising since larger firms are more likely to respond to workplace problems with "programs."

Perceptions of Drug Problems at the Workplace

Companies have different views on substance abuse problems in the workplace. For example, the survey indicates drug testing employers may perceive substance abuse as a more complex-though not necessarily a more serious-problem than their non-testing counterparts. However, executives in testing and non-testing firms agree that while substance abuse is not confined to any one group of employees, these problems tend to be concentrated in certain operations or locations.

Major differences exist in attitudes toward alcohol, illegal drugs and recent trends. Very few responding firms believe illegal drugs alone are the primary form of substance abuse problems at the workplace. There is, however, great disagreement among survey participants regarding the prominence of alcohol abuse in their work forces. Executives in nearly two-thirds of the drug testing firms blame alcohol and illegal drug use for significant problems among their employees; only one in four reported alcohol alone as the most critical problem. By contrast, almost two-thirds of the employers without testing programs regard alcohol as the principal substance of abuse, and only about one-third say they have serious problems with other drugs.

Not surprisingly, nearly half the drug testers describe illegal drug use as a more serious problem than it was 5 years ago, while only 10 percent believe alcohol abuse is increasing. In the non-testing population, a somewhat larger percentage sees alcohol as a growing problem, and relatively fewer view illegal drugs in that light. Executives in drug testing firms seem to be slightly more optimistic than non-testers about trends in alcohol and drug use during the last 5 years. On the other hand, more officials in the non-testing group responded “don’t know” when asked about recent trends in their companies.

How seriously employers view drug problems also influences their decision to implement or reject drug testing as a substance abuse control strategy. Executives who have launched drug testing programs say the single most compelling reason for taking action was evidence of drug problems at the workplace. Many of those who discarded the option, after investigating the pros and cons, express concern about the negative impact such a strategy would have on employee relations—particularly where drug abuse is not deemed to be a significant problem.

Other Initiatives To Control Substance Abuse

Overall, actions of corporations with drug testing programs seem to be consistent with their executives’ attitudes toward substance abuse. They see a serious, polydrug problem not under control, and are dealing with it in a variety of ways. Firms not engaged in drug testing also appear less likely to undertake other activities to combat drug problems. The industrial make-up of non-testing firms is a significant factor. Unlike manufacturing firms, few have the tradition of occupational alcoholism programs. Without long experience in dealing with employee substance abuse, many may be feeling their way before developing specific responses to such problems. Some employers may consider themselves insulated from substance abuse problems because of what they view as special circumstances, such as the nature of their work force, type of industry, or region of the country.

The Conference Board survey found that drug testing firms have a consistently greater involvement with other substance abuse control measures than non-testing firms. This would seem to contradict the view held by some opponents of drug testing that this strategy is often used as a stand-alone procedure for “curing” workplace drug problems. Instead, it appears that most companies involved in drug testing move cautiously before adopting such programs, and put in place or adapt other measures in an effort to construct a well-defined and coordinated drug-control strategy.

1. Substance Abuse Policies and Procedures

More than 90 percent of the companies with drug testing programs have written substance abuse policies. Almost 40 percent of those with policies have had them in place for at least 5 years. A significant number of these firms indicate, however, that their policies have been updated within the last several years, often to broaden their focus. Over 70 percent of the drug testing firms' policies now cover employee use of all mind- and behavior-altering substances—includingprescription drugs—and more than 25 percent regulate both on- and off-the-job behavior. By comparison, nearly half the non-testing group have no written substance abuse policies, and where such policies exist, they tend to be of more recent origin and less comprehensive in scope.

Policies express employer positions on substance abuse in general terms. More detailed procedures to assist supervisors confronted with employee drug problems help clarify responsibilities and outline specific actions. As drug-testing firms are more likely to have written policies, a larger percentage of them also prepare written guidelines for their supervisors.

2. Drug Training and Education

The extent to which corporations communicate their policies determines their effectiveness. Experts on policy development recommend that employers take advantage of every available opportunity to inform employees about the company's commitment to its substance abuse policy. Among surveyed firms with drug testing programs, policies are communicated through:

- New-employee training programs
- Special training sessions for current employees and supervisors
- Employee handbooks
- Company newsletters or magazines

Non-testing firms also rely on new employee orientation and employee handbooks to inform workers of company policy, but tend to place less emphasis on training sessions.

Companies engaged in drug testing develop or sponsor educational materials regarding dangers of alcohol and drug use almost twice as often as non-testing firms. In addition, while employers in both groups sometimes distribute information prepared by government agencies or other outside organizations, generic materials are used more frequently in companies without drug testing.

3. Employee Assistance Programs

Employee assistance and counseling services (EAPs) are considered by many corporations to be an essential component of a comprehensive substance abuse control strategy. Over the years, they have evolved from occupational alcoholism programs to broad-brush services that deal with employee use of addictive drugs, as well as a wide variety of other problems encountered by employees and their dependents (e.g., other health issues, personal, marital, family, legal, and financial problems). Their focus has been to help employees overcome problems that may interfere with their productivity on the job.

EAP services have come to be recognized (and recommended by legal experts) as a positive indication of company willingness to accommodate employees with substance abuse or other problems before taking punitive action. The controversial aspects of drug testing have received more attention as testing has become more popular among employers. Thus, while EAPs predate drug testing programs in many firms, others started EAPs when they initiated drug testing. The primary motive of EAPs may be to assist employees with drug problems, but they also serve as protection against employee challenges to drug-related disciplinary actions or discharges.

The survey found that more than 75 percent of the companies testing for drugs make employee assistance and counseling services available to their employees. Less than 60 percent of the non-testing companies have EAPs. Although close to 50 percent of the EAPs reported in the survey are more than 5 years old, about 20 percent have been operating less than 2 years. EAPs in non-testing firms are generally of more recent origin and more likely to be provided by outside contractors.

4. Security Procedures

Few companies surveyed have adopted special security measures, such as locker and desk searches, searches of employee vehicles on company property, checks on entering and leaving the worksite, or drug-sniffing dogs, to deal with drug problems on company property. The survey showed that just 36 percent of employers with drug testing programs instituted such procedures. The number of non-testing firms employing any special security measures is very small.

CONCLUSIONS

Drug testing programs are common among major manufacturing firms and in the utility and transportation sectors, but are far less prevalent in other businesses. The high incidence of drug testing among firms in The Conference Board survey is reflective of both sample selection and response rates. Companies with drug testing programs seem to regard drug problems as more pervasive and more complex than do non-testing companies, and are consistently more likely to employ multiple strategies for dealing with workplace drug use.

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Drug Abuse Services and EAPs: Preliminary Report on a National Study

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INTRODUCTION

Since January 1987, the National Study of Workplace Drug Abuse Programs has been gathering data on drug abuse services in American Employee Assistance Programs (EAPs). The Study has two main objectives: first, to develop data-based *typotogies* of EAP drug abuse services and the organizational contexts in which they occur; and second, to identify and study *emerging* issues that will significantly affect future services development.

In Phase I of the research, survey data were compiled on 1238 EAPs, based on a questionnaire completed by EAP coordinators and program administrators in late 1987. All major geographic areas, types of workplaces, and types of EAPs were well-represented. Because the survey deliberately excluded coverage of alcohol, the resulting database is one of the largest and most current that focuses exclusively on drug abuse services.

Findings from Phase I reported here are preliminary because a number of analyses of this database were in progress when this report was prepared. Sample representativeness for the entire population of EAPs is being examined, along with the influence of variables such as size and age of the EAP on our findings (see Backer & O'Hara, 1988a,b for a more detailed presentation).

Phase II of the research involved 201 intensive telephone interviews with EAP coordinators selected at random from survey respondents. Findings from this research phase as well as results from several smaller-scale studies form the total dataset for the study, supported principally by NIDA

Table 1. Portrait of Responding EAPs

	% Respondents
Type of EAP	
Internal EAP	47.2
External EAP	40.8
Consortia EAP	8.8
Union EAP	3.3
Type of Workplace	
Health Care	17.0
Government	15.7
Industrial Manufacturing	15.0
Aggregate of 17 other Categories	52.3
Age of EAP	
Less than One Year	10.4
1 to 2 Years	21.1
3 to 5 Years	32.6
6 to 10 Years	20.3
More than 10 Years	15.7
Location of EAP	
Human Resources/Personnel	64.3
Medical Department	15.9
CEO or Top Management	12.4
Other	7.4

EAP DRUG ABUSE TYPOLOGIES

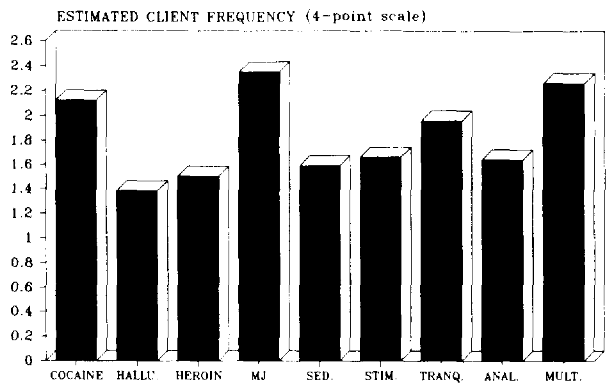
Analysis of Responding EAPs and Their Drug Abuse Services

The study categorized the 1238 EAPs into several program types similar to those used by the Association of Labor and Management Consultants on Alcoholism (ALMACA) (Table 1). Health care institutions and government had the highest percentage of EAR respondents. EARS of industrial and manufacturing firms had the second highest percentage. There were 17 other categories of respondents. The largest number of responding EAPs are from 3 to 5 years old, but a sizeable portion have been in existence for more than ten years. Sixty-four percent of the EAPs are housed in the organization's human resources or personnel department, but a fair number are either in the medical department or report directly to top management. The study database also includes information on referral patterns, budget, staffing, and other features of the EAP operation.

Responding EAPs report they deal with a wide variety of drugs of abuse (Figure 1). As expected, marijuana and cocaine are the two most frequently reported, and multiple drug abuse is extremely common. Other late 1987 studies, such as those by *Business & Legal Reports* (1987)and by CATOR(Hoffmann & Harrison, 1987) show essentially the same findings.

The core EAP services of crisis intervention, assessment and referral are almost universally offered-other data from our study indicate that the lower referrals to public drug abuse agencies has to do at least in part with the well-publicized waiting lists these agencies struggle with. Brief counseling is less common, and in-program treatment even less so, though about 10 percent of respondents do offer it (Table 2).

Figure 1. DRUGS OF ABUSE
(Excluding Alcohol)



The overwhelming majority of programs serve 1-10 drug abusers per month (Figure 2). Larger EAPs see more drug abusers, of course, but the number of drug abuse cases seen across programs of all sizes is still relatively small. Our telephone interview data agree with other recent findings that the number of alcohol problems presented to EAPs is much greater than for non-alcohol drugs (e.g., Roman & Blum, 1987).

While half of the EAPs in this sample always take a drug history, regardless of presenting problem, a significant minority only take one when the presenting problem is drug abuse, and almost a quarter take them only sometimes or not at all (Figure 3). Telephone interview data confirm that EAP professionals need more education about the problem-finding aspects of drug history-taking.

Table 2. Types of Services Rendered

	% Respondents
Referral to Inpatient Chemical Dependency Facilities	98.9
Problem Assessment	98.3
Referral to Outpatient Chemical Dependency Facilities	97.8
Referral to 12-Step Program or Self-Help Groups	97.5
Crisis Intervention	94.5
Referral to Family Group Counseling	94.5
Follow-up Monitoring of Workers Referred for Outside Treatment	94.3
Referral to Public Drug Abuse Agency	86.1
Brief In-Program Treatment (2-5 Sessions)	74.3
In-Program Treatment	9.7

Figure 2.
NUMBER OF DRUG ABUSERS SERVED/MONTH

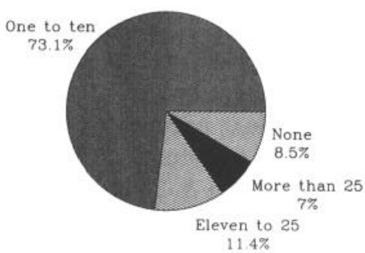
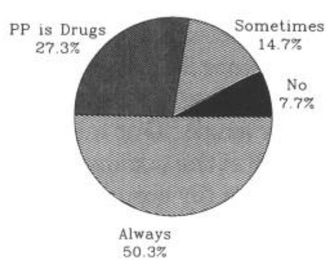


Figure 3.
DRUG HISTORY TAKEN



Organizational Context in Which EAP Drug Abuse Services Occur

Three-fourths of the responding EAPs are in organizations which have a written drug abuse policy (Figure 4). If those who said their workplace was developing a policy are included, almost 9 out of 10 responding EAPs are in policy-based organizations,

The incidence of drug testing programs in this sample is generally commensurate with what has been found in other research of about the same vintage-the end of 1987 (Figure 5). Findings in this area are being compared with those in 10 other recent studies documented in O'Hara & Backer (1989).

Overall, respondents say their top management is quite supportive of the EAP (Figure 6). This suggests a healthy organizational foundation for responding EAPs. Our respondents nonetheless have concerns about how much support of the EAP *concept* or program filters down into the day-to-day support of effective management referral and willingness to reduce the stress in the workplace that places workers at risk for drug abuse.

Figure 4.
WRITTEN POLICY
ON DRUG ABUSE

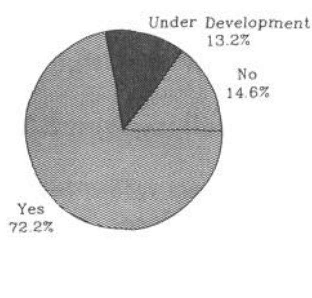
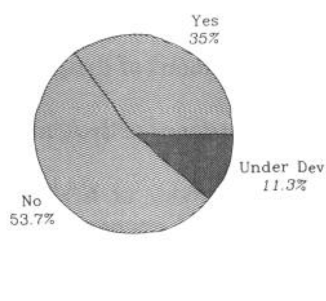


Figure 5.
ORGANIZATIONAL
DRUG TESTING PROGRAM



Helping employees return to work and providing an employee benefits are the most important reasons organizations want to have EAPs, according to our respondents (Figure 7). Relieving supervisors of the need to deal directly with troubled employees is third. However, organizationally-focused goals such as cost containment and avoiding litigation were also cited frequently. The dataset also includes information about the geographic base of the respondent work organization, and its workforce size, among other variables.

EMERGING ISSUES

The 10 most important emerging issues identified by the 1238 responding EAPs are:

- Concern about effectiveness of EAP drug abuse interventions
- Impact of drug testing on the EAP
- Impact of managed care on the EAP
- Response of the EAP to AIDS
- Impact of litigation on the EAP
- Effectiveness of EAP management training and management referral practices
- Development of drug abuse education and prevention activities
- Development of drug abuse services by EAP consortia
- Development of drug abuse services by small employer EAPs
- Unmet needs of EAP professionals as these relate to perceived challenges of drug abuse in the workplace

Key elements for each of these emerging issues follow.

Concern About Effectiveness of EAP Drug Abuse Interventions

Overall, reviews of their own effectiveness by the responding EAPs were mixed (Figure 8). Only one-third of the respondents felt their program

Figure 6. SUPPORTIVENESS OF TOP MANAGEMENT

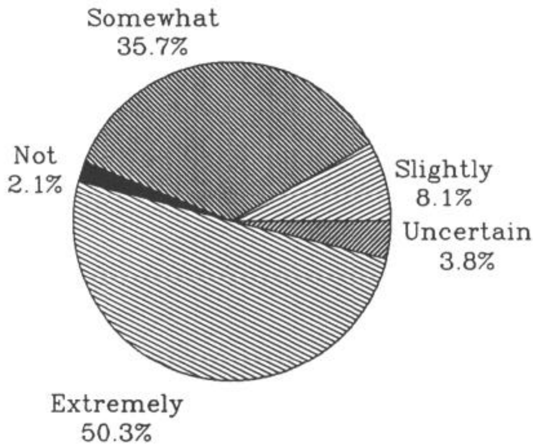


Figure 7. REASON ORGANIZATION HAS AN EAP

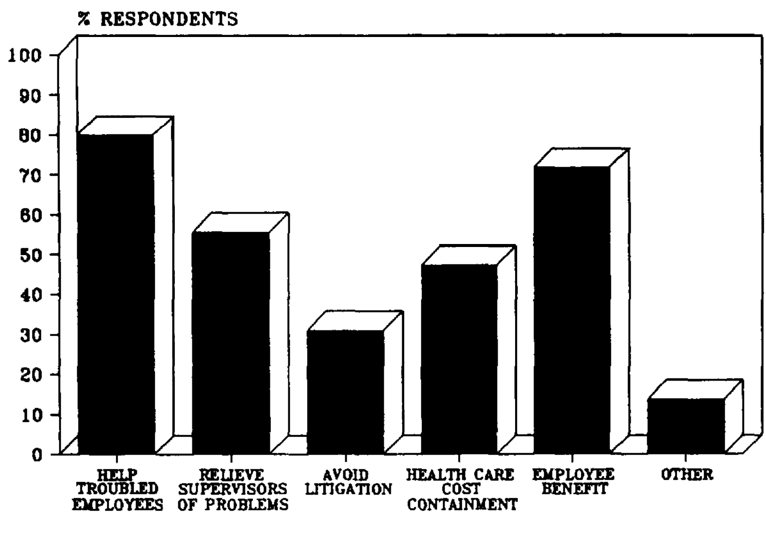
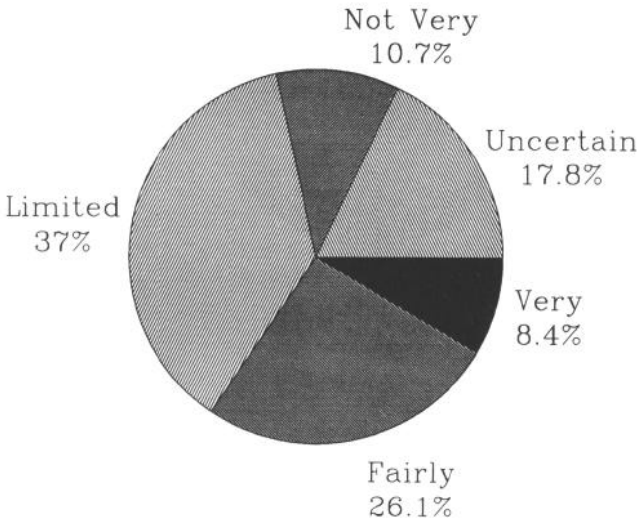


Figure 8. EFFECTIVENESS
OF EAP DRUG INTERVENTION



had been "fairly effective" or "very effective" in meeting the challenges of drug abuse in the workplace. Also, only one-quarter reported that more than 50 percent of the workers they have referred to drug abuse treatment have been successfully rehabilitated. This is not surprising in light of the high rates of recidivism quoted by respondents and reflected in other data sources.

A multiple regression analysis of ratings on a two-factor survey scale of EAP effectiveness in handling drug abuse cases showed that the level of support provided by top management was the single most important factor associated with overall program effectiveness. As might be expected, the number of years the EAP had been in existence also was important, as was the extent of EAP staff training on drug abuse. Respondents from internally-based EMPs rated themselves significantly higher in effectiveness in fighting drug abuse than did external EAP coordinators in a one-way analysis of variance procedure using the two-item effectiveness scale.

Table 3. Drug Testing and EAP Effectiveness and Litigation

	% EAPs in Drug Testing Workplace	% EAPs not in Drug Testing Workplace
Fairly/Very Effective EAP	39.9	30.0
Litigation Against EAP	6.6	2.7

The data analysis is being continued to determine whether size, age of EAP or other factors may account for some of these findings, but overall it appears many American EAPs may lack self-confidence where drug abuse services are concerned.

Impact of Drug Testing on the EAP

Many claims have been made in the last 2 years about possible positive impact of drug testing programs on other workplace drug abuse services. Though the data are still being analyzed to look for confounding influences, there is some modest support for these claims. There was a statistically significant difference in rated effectiveness between EAPs in organizations with drug testing programs and those without them (Table 3). This held up across five of our seven effectiveness variables. On the other hand, EAPs in drug testing organizations also were significantly more likely to have had experience with litigation unrelated to testing.

There are a number of other important differences between the EAPs in organizations with and without drug testing. However, we have to be cautious in interpreting these at present because larger, older EAPs also are more likely to have drug testing programs.

Impact of Managed Care on the EAP

Professional publications, ALMACA conferences, and some of the largest EAP consulting firms have given much attention recently to managed care and EAPs. This study found that some elements of managed care—EAP case management, relationships with HMOs and PPOs, and even benefits certification programs-are already quite common (Figure 9). Telephone interviews in Phase II have gathered a rich array of actual EAP experiences in managed care which will help determine what needs to happen next in developing effective linkages between managed care and EAP activities.

Response of the EAP to AIDS

Although EAPs have certainly become involved in the AIDS health crisis, the level of their involvement is significantly less than that of other organizational units, such as human resources. About a third have conducted programs on personal risk reduction, or on workplace issues such as working alongside a person with AIDS. About 30 percent of responding EAPs are in organizations with written policies on AIDS, a rate similar to that found in recent studies by *Fortune* magazine and others (Sprinzen, 1988).

However, almost half of the EAPs surveyed have NOT made a response to AIDS (Figure 10). Phase II telephone interview findings make it clear that there is a tremendous need for EAP professionals to have the understanding, the training materials and guidance needed to participate meaningfully in the overall organizational response to AIDS. In many cases, the telephone interviews revealed that external EAPs had not made a response to AIDS because it is not part of their contract with the employer. More and more external EAPs are requesting to become involved in this area.

Impact of Litigation on the EAP

One in twenty EAPs in this sample has been sued regarding some aspect of service delivery; even more workplaces have been sued regarding some aspect of drug testing (Table 4). In addition to raising issues for individual EAP practitioners such as adequacy of professional liability insurance, this finding also suggests that some employers may begin looking askance at the value of employee assistance, if an EAP brings with it the threat of legal entanglements and costs of legal actions.

Table 4. Litigation and EAPs

	% Respondents
Litigation Related to EAPs Services	4.5
Litigation Related to Drug Testing	8.4

Figure 9. EAP MANAGED CARE ACTIVITIES

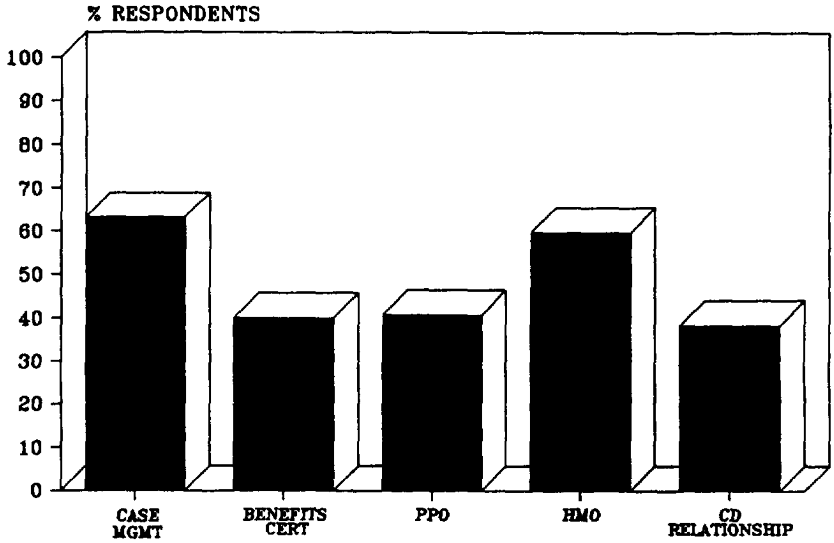
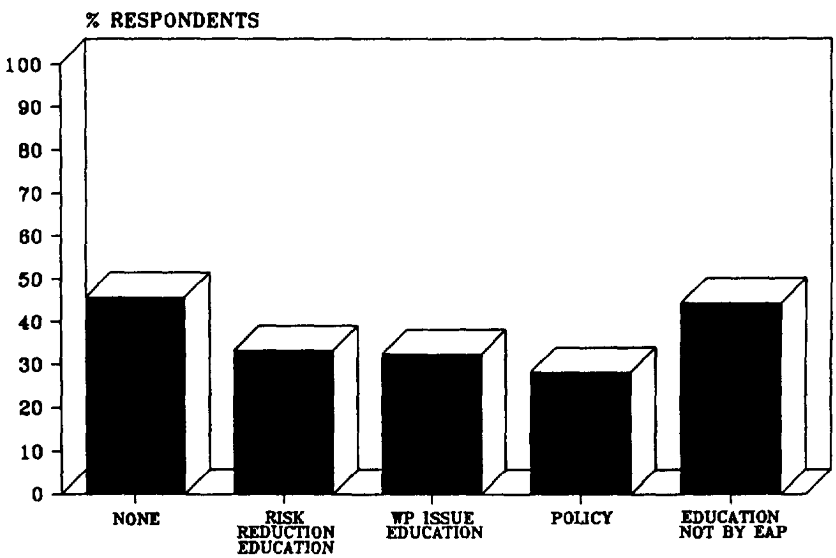


Figure 10. RESPONSE OF EAPS TO AIDS



Effectiveness of EAP Management Training and Management Referral Practices

The EAPs in this sample provide a considerable amount of drug abuse training for managers and front-line supervisors in their organizations (Figure 11). However, they still cited increased management trainingas the second "most important development that could improve the effectiveness of the EAP in dealing with employee drug abuse." Both telephone interview and survey data suggest that training on referral practices is the biggest shortfall respondents currently see.

Figure 11. PREVALENCE OF MGMT/SUPERVISORY TRAINING

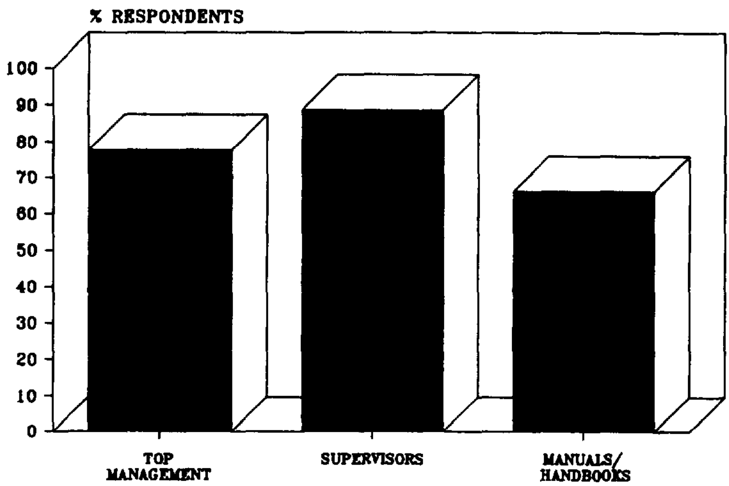


Figure 12. EDUCATION AND PREVENTION ACTIVITIES

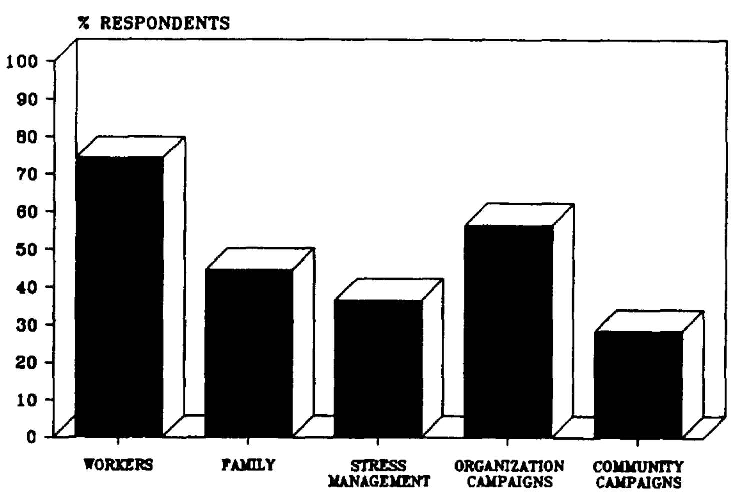


Table 5. Comparison of EAP Consortia to Other Respondents

	% Consortia	% Other
Fairly/Very Effective in Fighting	47.4	33.3
Have Written Policy on Drug Abuse	76.0	72.2
Have Drug Testing Program	34.7	35.4
Have Had Litigation Related to Drug Testing	6.7	8.7
Have Had Litigation Related to EAP	0.0	5.0
Have Had Problems with Drug Sales	17.5	17.4

Development of Drug Abuse Education and Prevention Activities

In the survey sample, drug abuse education for workers was quite common, offered by three-quarters of all respondents (Figure 12). However, community and prevention-oriented activities such as stress management for those at risk for drug abuse are offered much less frequently. Clearly, there is still room for significant program development in these areas.

Development of Drug Abuse Services by EAP Consortia

Another subject of emerging concern in our dataset is the consortium. It is one of the least-documented models for EAP service delivery, yet there is some informal evidence that consortia have been effective in providing EAP services for smaller employers (Table 5). Findings from the subsample of 100 consortia programs were somewhat surprising—consortium EAPs rate themselves as significantly more effective than do the other EAPs in our sample. None of this sample reports having experienced EAP-related litigation.

Development of Drug Abuse Services by Small Employer EAPs

By comparing the small—fewer than 500 employees—with the large—more than 10,000 employees—organizations in this sample, some relatively dramatic differences emerge (Table 6). While smaller employer EAPs are much less likely to have experienced litigation or drug sale problems, they are also less likely to have a written policy on drug abuse, and rate themselves as significantly less effective in their drug abuse services. These differences are all statistically significant at the highest

Table 6. Comparison of Small Versus Large Workplaces

	% Small	% Large
Fairly/Very Effictive in Fighting	24.3	43.3
Have Written Policy on Drug Abuse	59.1	80.0
Have Drug Testing Program	23.1	54.2
Have Had Litigation Related to Drug Testing	3.0	21.4
Have Had Litigation Related to EAP Services	1.5	11.6
Have Had Problems with Drug Sales	9.3	25.9

level, and most of them are maintained even when the comparison is between small firms and *all* others in the Phase I sample. Yet the data clearly show that EAP professionals' needs for education, information and interventions are largely the same *regardless* of employer size. Taken together, these results make it clear that research, and program and policy development aimed at smaller employer EAPs are needed.

The final report of the White House Conference on Drug Abuse (1988) states the need for comprehensive drug abuse services for small employers well:

> Small businesses employ approximately half the workforce (45 million persons) and account for half of the gross national product. Companies with 500 employees or fewer constitute about 70 percent of total US businesses; four million businesses have 10 or fewer employees. These figures underscore the need for small business involvement in achieving a drug-free workplace.
>
> Many of the drug policy models used for larger companies will not work in the small business workplace, and most small businesses do not know where to turn for assistance in dealing with a drug problem in their workforce. The SBA, other Federal agencies, and private organizations

Table 7. Unmet Needs of EAP Professionals Regarding Drug Abuse Services

	Mean Importance (4-point Scale)
Provision of Adequate Drug Abuse Services by HMOs	3.27
Workers and Public Safety Related to Drug	2.90
Provision of a Continuum of Care for Recovering Drug Abusers	2.83
Health Care Cost Containment Related to Drug Abuse	2.71
Insurance Coverage for Drug Related Problems	2.66
Training Supervisors To Deal with Drug-Abusing Workers	2.60
Having Effective Drug Treatment Programs Available	2.51
Management Commitment to Righting Drug Abuse	2.48
Drug Testing in the Workplace	2.38
Demonstrating Cost-Effectiveness of the EAP	2.35
Increasing Quality of EAP Counseling Services	2.03
Certification of EAP Professionals	1.85

> that work closely with the small business community must develop means to help small businesses respond to the problem of illegal drugs. "No use" policies, properly implemented in small businesses, can help assure drug-free workplaces (pp. 89-90).

Unmet Needs of EAP Professionals as These Relate to the Perceived Challenges of Drug Abuse in the Workplace

The most important challenges the 1238 respondents currently see are getting HMOs to provide adequate services, dealing with public safety issues, and providing an effective continuum of care. Insurance coverage, cost containment and training are also important (Table 7). Profes-

Table 8. What EAP Professionals Want to Help Them in Fighting Drug Abuse in the Workplace

	% Respondents
Changes in Attitude of Top Management	25.0
Increased Drug Abuse Education for supervisors	21.7
Improvements in Insurance and Benefits	10.1
More Resources for the EAP	9.8
Changes in the Attitudes of Local Community	7.6
More Written Materials on Drug Abuse	6.5
Increased Drug Abuse Training for Workers	4.8
Increased Drug Testing	4.6
Improved Treatment Techniques	4.4
Decreased Drug Abuse Testing	0.5
Other	4.9

sional issues such as certification and enhancing EAP counseling fall much further down the line.

The most important change, cited by a full 25 percent of all respondents, that would help EAPs in the war against drugs in the workplace, is a change in top management attitude (Table 8). Since respondents already rate top management as supportive of the EAP per se, we speculate that the change they seek has more to do with overall attitudes towards drug abuse and its rehabilitation. This finding may be related to the perception among some employers that an EAP is a “quick fix” solution which relieves them of further responsibility to deal with drug abuse such as reducing the stressful conditions of work that may cause workers to abuse drugs again despite successful recovery experiences. More education for first-line supervisors was the second most important change these respondents wanted to see.

There were also a number of write-in responses in the Phase I dataset, concerning what specific kinds of resources or services respondents felt would help them deal with the challenges of drugs in the workplace.

They particularly wanted standards for evaluating drug treatment facilities, evaluation standards for EAPs, and standards for drug testing programs, confirming the importance of major elements in NIDA's current intramural and extramural programs.

CONCLUSIONS

When asked what NIDA could do to support EAP drug abuse activities, more than a third of Phase I respondents wanted more informational materials. This was more than twice the number making the next-most-often cited request for more training programs for EAP professionals. Interestingly, only a very small percentage felt that having NIDA sponsor the development of improved treatment techniques would benefit them directly. These program and policy recommendations will, we hope, become more specific and useful as our data analysis proceeds.

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The Presence and Integration of Drug Abuse Intervention in Human Resource Management

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INTRODUCTION

That alcohol and other drug misuse adversely affect job performance and productivity is not a new idea. There are studies that indicate drug and alcohol abusers are absent from work more, are involved in more accidents, use more sick leave, use more medical benefits, and have more difficulty getting along with their co-workers, than their non-abusing counterparts. Co-workers, subordinates, and supervisors of chemically-dependent employees are also likely to be less productive on the job. In addition, the costs of medical benefit usage by dependents of those with alcohol and drug problems have been shown to be higher than those of other workers' family members (Jones and Vischi, 1979; Holder, 1987). The methodologies of the various studies allow for argument about exact costs and prevalence of chemical dependency. However, the fact remains that work organizations, in terms of both economic and human costs, are significantly affected by alcohol and drug misuse (Bureau of National Affairs, 1986).

The past few years have seen a renewed interest in constructive initiatives and solutions for realizing a "drug-free workplace." The two types of programming that have received the most interest are drug screening and Employee Assistance Programs (EAPs). This paper presents data from four research projects that are part of a research program in work site human resources and behavioral health management. The four research projects examine the work site management of drug abuse from the perspective of various "stakeholders" (members of different constituencies) who have an interest in work site prevalence and management of drug abuse:

- Human resources/personnel managers

- Supervisors and managers

- EAP coordinators

- Employees

HUMAN RESOURCES MANAGEMENT STUDY

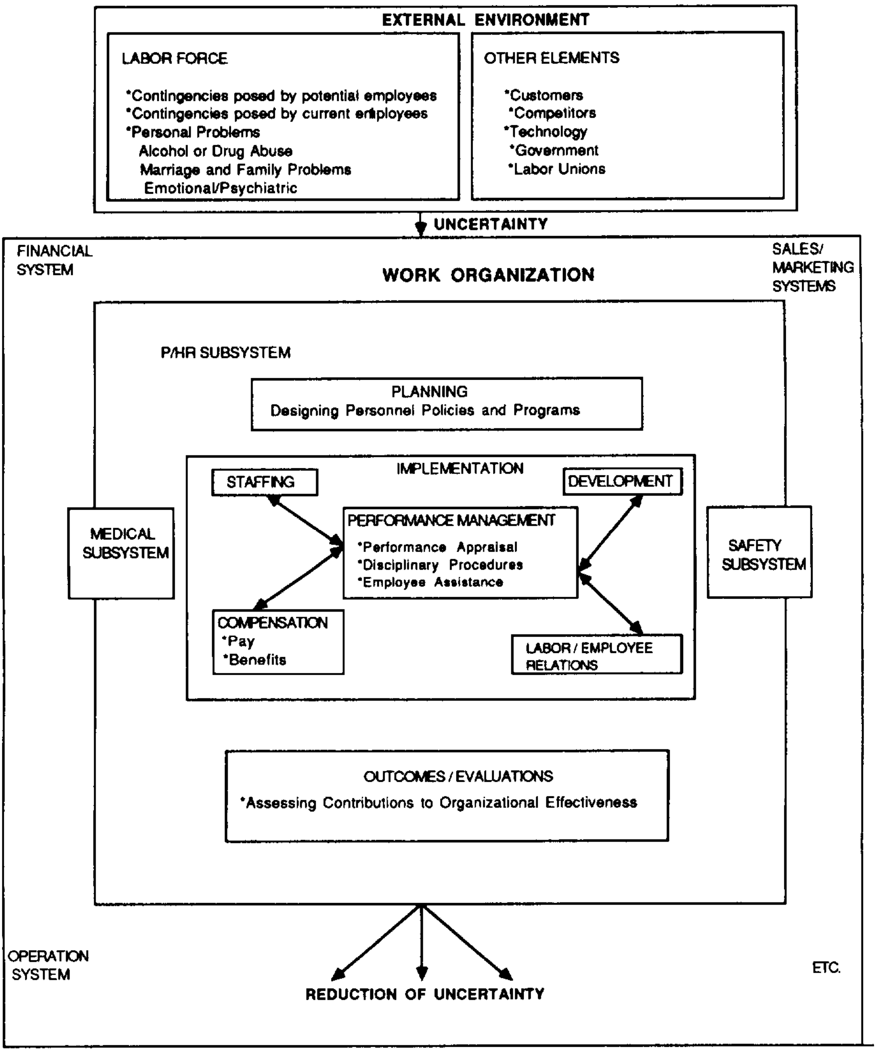
First we consider preliminary results from a stratified random sample of organizational operating units with 250 or more employees in the Atlanta, Athens, and Columbus, Georgia Standard Metropolitan Statistical Areas (SMSAs). The Atlanta area ranks seventh in the number of Fortune 500 headquarters (10), with 431 of the Fortune 500 having operations in the Atlanta area. It is, thus, a representative location of major U.S. business interests. The research population from which the sample was drawn includes these organizations, as well as other private sector (for-profit) work organizations. Worksites ranging from service sector organizations to poultry and textile plants to high technology business and industry are included in the sample.

During 1988, a research team conducted two 2-hour on-site interviews with personnel/human resources managers and requested the completion of self-administered questionnaires. The data presented here is based on the first 125 questionnaire responses (representing a response rate over 85 percent), approximately one-half of which are for work sites with fewer than 500 employees.

We contend that effective work site responses to drug problems should be considered within a systems context, with consideration of how business and industry anticipate and respond to other personnel/human resources issues. Effective solutions for newly salient problems that have not been traditionally dealt with through work settings could be informed by a better understandingofhow organizations deal with their central or core, as well as with other nontraditional, personnel/human resources management tasks. This avoids the all-too-common myopic vision in examining drug problems apart from other management problems and practices. A broader perspective can lead to more informed choices, to commitments based on common understanding, and to more thoroughly implemented and effective practices.

Figure 1 portrays a model of the personnel/human resources management system, which exists within an organization along with other organizational systems (adapted from Scarpello and Ledvinka, 1988). The human resources management system deals with the organizational contingencies that are posed by the employee/human interface with the organization's core technology, and with the contingencies and

FIGURE 1
PERSONNEL / HUMAN RESOURCE SYSTEM



uncertainties that are imported into the work organization from the organization's external environment. Personal problems of members of the labor force, including alcohol or other drug problems, are part of the external environment that impact the organization. Personal problems of current employees are also a source of potential uncertainty for an organization, the resolution of which includes the personnel/human resources management function (Blum and Roman, 1989a).

Table 1 presents data from personnel/human resource managers in our study, indicating their perceived "strategic uncertainty" with regard to the 13 human resources issuesrelatingto the task, social, and regulatory sectors of the personnel/human resources (p/hr) environment. Strategic uncertainty has three components: the *importance* of the issue, the *complexity* of responses to the issue, and the degree to which the issue is *stable or changing*. Each component is ranked from one through five,

Table 1. Perceived Strategic Uncertainty and Perceived Effectiveness: Descriptive Statistics and Pearson Correlations

	Strategic Uncertainty*		Effective		Correlation**
	X	SD	% Strongly agree	% agree	
Task (Alpha = .62)	26.4	8.3			.23
Staffing	27.6	9.6	30%	69%	.24
Performance Appraisal	24.6	11.6	21%	41%	.20
Compensation	31.9	12.4	22%	46%	.42
Social (Alpha = .86)	23.3	6.6			.59
Stress	20.0	9.3	4%	11%	.49
AIDS	22.4	12.3	7%	26%	.56
Alcohol Abuse	25.6	12.9	6%	36%	.41
Drug Abuse	26.4	12.6	6%	37%	.32
Family Problems	23.2	11.9	2%	26%	.57
Healthy Lifestyles	19.7	9.8	1%	17%	.55
Regulatory (Alpha = .70)	34.1	8.8			.48
Employee Relations	34.6	11.3	24%	61%	.43
Safety	26.7	13.9	23%	30%	.35
Government Regulations	34.1	12.8	39%	66%	.32
Health Care Cost Containment	39.1	11.0	11%	44%	.30

*minimum = 2, maximum = 50
**All Correlations are significant at p<.05.

with five indicatingmost agreement and one indicating least agreement on the dimension. Perceived strategic uncertainty about an issue is measured by: Importance X (Complexity + Bate of Change) (Daft, Sormunen, and Parks, 1988). Each human resources issue's perceived strategic uncertainty has a theoretical minimum score of 2 and maximum of 50.

Generally, human resources issues relating to the regulatory environment yield greater strategic uncertainty while issues relating to the social environment yield less strategic uncertainty. The average uncertainty in the human resources function of dealing with employee drug abuse ranks in the middle of the 13 substantive areas. It does, however, rank highest among the six human resources issues considered as "social," with employee alcohol abuse and AIDS in the workplace ranking second and third in this category.

The perceived *effectiveness* of the human resources management system in dealing with the various issues is lowest for those issues in the social environment. Only 5 percent of the human resources managers strongly agree, and 34 percent agree, that they are effectively responding to the drug problem. By contrast, their perceived effectiveness in responding to the regulatory environment is the highest of the three areas. Thirty-nine percent strongly agree and 55 percent agree, for example, that the human resources department is effectively responding to government regulations. For each dimension and for the three combined areas there is a positive association between perceived uncertainty and perceived effectiveness in responding to an issue. This finding suggests that as the dimension of importance dominates the uncertainty measure, by its weighting of the complexity and rate of change, it is associated with effectiveness. If the issue is not considered important, it is an area of low strategic uncertainty, and is associated with lower levels of perceived effectiveness in managing the issue. Generally the associations between strategic uncertainty and effectiveness tend to be highest in the social environment areas, but the association between perceived uncertainty and effectiveness with regard to the effects of drug abuse is the lowest of the p/hr issues in the social environment category, even though it is a positive association.

Work organizations use a variety of policies, activities, and programs to respond to drug abuse. The human resources managers report that their organizations' responses include: educational campaigns, health promotion/wellness programs, support of community prevention and intervention programs, absenteeism programs, risk identification for high utilizers of health care benefits, changes in health care benefits for alcohol, drug, and mental health problems, policies concerning drug use on the job or away from the job, penalties for drug dealing, dog-aided searches, undercover operations, various types of drug screening, policies that provide for the organization to conduct drug screens, direct referral of drug abusers to treatment centers by medical or personnel department functionaries, and EAP policies.

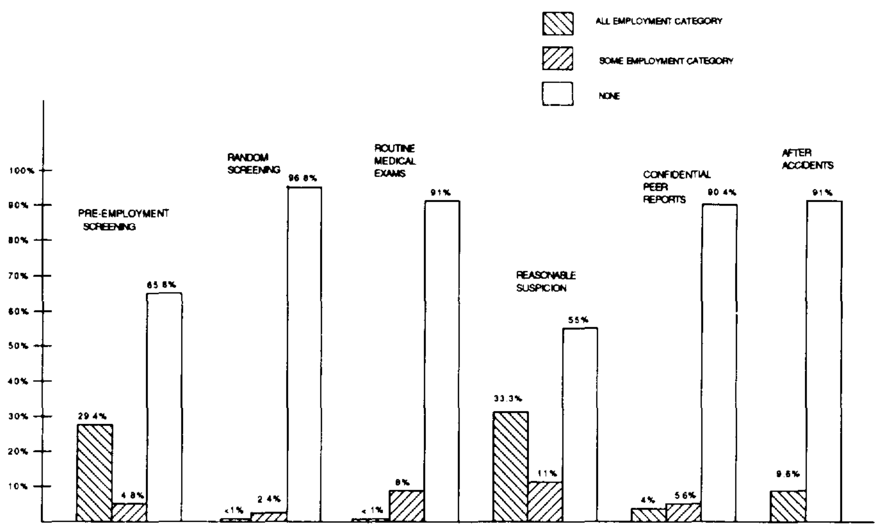
Fifty-seven percent of the organizations provide a formal EAP and 46 percent perform drug testing in at least one of the six types of potential drug screening situations about which data were collected. The six types of screening are:

- Preemployment screening
- Random screening
- Screening as part of a routine medical examination
- Screening for probable cause or part of a fitness for duty policy screening based on confidential peer reports
- Screening after accidents

Twenty-five percent of the organizations perform drug screening for at least some job categories in only one of the six conditions, with 13 percent in two of the conditions, and 7 percent in three of the conditions.

FIGURE 2

TYPES OF DRUG SCREENING

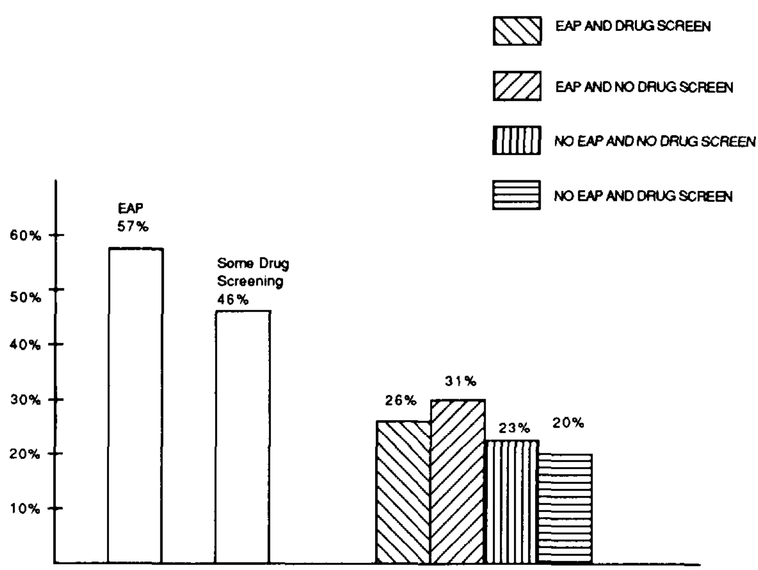


As shown in Figure 2, preemployment drug screening is the most prevalent type of drug screening program, with 29.4 percent of the sampled employers performing preemployment screening of all prospective employees and another 4.8 percent usingpreemployment screening in selected employment categories. The second most prevalent type of drug screening is screening based on reasonable suspicion/probable cause, with 33.3 percent of the work sites screening all employment categories under this condition and another 11 percent screening selected employment categories. The other types of screening are notably rare.

Figure 3 indicates the presence and the overlap in drug screening and EAPs. Twenty-three percent of the organizations have neither an EAP nor a drug screening program, 31 percent have an EAP but do not have a drug screening program, 26 percent have both an EAP and drug screening of at least selected employment categories in at least one of the 6 conditions, and 20 percent have drug screening but no EAP. Worksites with EAPs are more likely (39 percent) to have preemployment drug screening programs than work sites that do not have EAPs (28 percent). Worksites with EAPs tend to be more likely (47 percent) to screen at least some of their employment categories for reasonable cause than work sites that do not have EAPs (40 percent).

FIGURE 3

EAP AND DRUG SCREENING



It became evident during the interviews that drug screening was not *routinely* used in the vast majority of organizations that have policies that specify under what conditions they can or will use drug screening procedures, or in those without specific policies but with some reported use of drug screening. It also became evident that as one moved away from central city locations, drug screening programs or lack of drug screening programs both clustered. That is, in smaller communities, if one company did preemployment screening, the other employers that were interviewed also tended to preemployment screen, and vice versa. In general, work sites reported very few positive preemployment tests. When found, the preponderance of the positive tests indicated marijuana usage. There were, however, a few work sites where the positive test rates were relatively high.

Some organizations were experiencing dual problems in drug use and in staffing the organization. These organizations face particularly difficult decisions. In at least one instance, a work site that had many openings for semi-skilled workers performed preemployment screens, but hired those who came up positive anyway, with the admonition to the new employee that "that's two strikes against you."

However, the extent of difficulty the organization faced with attracting or retaining qualified employees was not statistically associated with preemployment nor with probable cause drug screening. Notably, organizations facing these conditions were significantly less likely to have an EAP. The extent to which the changing political or social climates were of concern to the organization were also not related to the presence of preemployment screening, probable cause screening, nor to the presence of an EAP. The extent to which absenteeism was a problem for the work site was not associated with preemployment screening nor with EAP presence, but was associated with probable cause screening. The extent to which workers' compensation claims was a concern to the work site was associated with probable cause screening; curiously, this concern was inversely associated with the presence of an EAP. The extent to which the accident rate was a major concern of the work site was associated with preemployment screening, probable cause screening, and inversely with the presence of an EAP. Concern about escalating health care costs or levels of work quality and quantity were not associated with drug screening nor EAP presence. While generally consistent with images ofdrugscreening, these three findings contradict perceptions that EAPs are widely seen as mechanisms to prevent or reduce these costly issues in the workplace. The bivariate associations are summarized in Table 2.

Table 2. Correlations: Organizational Concerns With Pre-Employment, Reasonable Cause Drug Screening and EAPs.

Management Concerns	Pre-Employment Drug Screening	Reasonable Cause Drug Screening	EAP
Attracting Qualified Employees	ns	ns	-.24
Retaining Qualified Employees	ns	ns	-.18
Changing Social Climate	ns	ns	ns
Changing Political Climate	ns	ns	ns
Absenteeism	ns	.20	ns
Worker's Compensation Claims	ns	.30	-.21
Turnover	ns	ns	-.18
Accident Rate	.24	.29	-.24
Escalating Health Care Costs	ns	ns	ns
Level of Work Quality	ns	ns	ns
Level of Work Quantity	.18	ns	ns

The work site's concern about the changing political climate and with workers' compensation claims were associated with perceived strategic uncertainty pertaining to the drug abuse issue, but were not associated with the work site's perceived effectiveness in dealing with the issue. The work site's concern with accident rates was associated with both the perceived effectiveness and perceived strategic uncertainty with regard to the drug abuse issue.

Preemployment drug screening and reasonable cause drug screening are associated with human resource department beliefs about drug screening. Beliefs about drug screening are not associated with the presence of EAPs, however. As indicated in Table 3, beliefs that drug screening is effective for dealing with workplace safety, productivity problems, public safety, and workplace morale are associated with preemployment screening. Except for the belief that drug screening is effective for dealing with productivity problems, each of these beliefs is also associated with reasonable cause drug screening. Beliefs that drug screening is an effective means ofgetting public trust are not associated with preemployment screening, but are associated with probable cause screening. Beliefs that drug screening is an invasion of privacy, is inaccurate, is unnecessary, is too costly, is opposed by management, or is opposed by employees are each inversely associated with preemployment or reasonable suspicion drug screening programs. Beliefs that drug screening provides help to employees who use drugs or that drug screening has a potentially negative effect on employee morale are not associated with either type of drug screening activity.

Table 3. Correlations: Drug Screening Beliefs With Pre-Employment, Reasonable Cause Drug Screening, and EAPs.

Human Resource Department's Drug Screening Beliefs	Pre-employment Drug Screening	Reasonable Cause Drug Screening	EAP
Effective means for dealing with workplace safety	.33	.25	ns
Provides help to employees that do use drugs	ns	ns	ns
Invasion of privacy	-.33	-.35	ns
Effective means of dealing with productivity problems	.29	ns	ns
Inaccurate	-.42	-.22	ns
Effective means of dealing with public safety	.23	.21	ns
Potentially negative impact on morale	ns	ns	ns
Effective means of dealing with workplace morale	.23	.29	ns
Benefit to employees who do not use drugs	.35	.26	ns
Is not necessary	-.50	-.33	ns
Is too costly	-.42	-.21	ns
Effective means of getting public trust	ns	.24	ns
Is opposed by management	-.52	-.37	ns
Effective means of dealing with national security	ns	ns	ns
Is opposed by employees	-.36	-.22	ns

Reasonable cause drug screening, preemployment drug screening, and the presence of an EAP are each related to the perception of effectiveness in dealing with the impact of drug abuse in the workplace. Regression analyses presented in Table 4 indicate that when all three programs are in the equation, only the presence of an EAP and reasonable cause drug screening are significantly related to the perception of effectiveness with regard to drug abuse. The association between preemployment screening and perceived effectiveness becomes not significant when both EAP and preemployment screening are in the equation, but the association between EAP and effectiveness remains significant. When both EAP and reasonable cause drug screening are in the equation, both are significantly related to the perception of effectiveness with regard to drug abuse, Analyses of interaction effects did not produce consistent results. However, there is some indication that organizations with both EAPs and reasonable cause screening have perceptions of greater effectiveness with regard to drug abuse issues.

Table 4. Regressions of Perceived Effectiveness on EAP, Reasonable Cause, and Pre-Employment Drug Screening

	Perceived Effectiveness in Responding to the Impact of Drug Abuse		Perceived Effectiveness in Responding to the Impact of Alcohol Abuse	
	b	p (2-tail)	b	p (2-tail)
EAP	.34	.033	.59	.000
Reasonable Cause	.21	.024	.07	.445
Pre-Employment	.06	.537	.01	.898
$R^2 = .10$			$R^2 = .12$	
EAP	.33	.040	.59	.000
Pre-Employment	.15	.095	.04	.63
$R^2 = .06$			$R^2 = .11$	
EAP	.35	.027	.60	.000
Reasonable Cause	.23	.006	.07	.370
$R^2 = .10$			$R^2 = .11$	

As with drug abuse, the perception of the effectiveness of dealing with alcohol abuse is significantly associated with the presence of EAPs. However, preemployment and reasonable cause screening for drug abuse are not significantly associated with the perceived effectiveness for alcohol abuse. These drug screening variables are not associated with the presence of EAPs in the bivariate case, and in the instances where they are in the same equation as EAP, they remain nonsignificant but do not affect the association between EAP and perceived effectiveness in dealing with the impact of alcohol abuse on the workplace. The lack of a significant association between drug screening and perceived effectiveness for alcohol abuse was expected; it may be seen as a validation check on the association between drug screening and perceived effectiveness in dealing with the impact of drug abuse. EAP presence on the other hand was expected to be associated with both perceptions of effectiveness, with the association found to be stronger for alcohol abuse than other drugs of abuse.

Types of drug screening other than preemployment or reasonable cause screening are rare in policy, even rarer in actual practice, and are unrelated to perceptions of effectiveness in dealing with drugs. Thus, the above analyses were limited to only the two types of screening, and these types of drug screening in either some or all employment categories were counted as drug screening programs.

SUPERVISOR AND MANAGEMENT AUDIT

Next we report preliminary analyses of survey data collected from 1,981 supervisors and managers of diverse occupational groups employed at multiple locations of a major corporation. The survey was conducted as part of an audit of an internally based multi-location corporate employee assistance program that covers approximately 55,000 employees and their family members. The program was initiated in 1975 and is based in the corporate medical department. The audit consisted of on-site interviews with eight EAP administrators, top and middle management at each of seven corporate or area headquarter locations, medical directors, and employees who used the EAP. Archival data on EAP utilization supplemented the interviews and surveys. The response rate to the mail survey that is the basis of this report was about 65 percent, which is approximately double the response rate that we expected based on the past experience of the organization in conducting its own internal surveys.

We contend that personnel/human resources policies and programs, including EAPs or drug screening, which are isolated from and not integrated into their work organization's operations, particularly their performance management systems, will not be very effective in responding to the target problems. This is particularly true for problems, such as drug abuse, about which troubled employees are likely to try to avoid detection, unlikely to admit a problem solely on their own, or be ambivalent about seeking help, whereas they may seek help for self-defined problems which they deny are related to drug use. The knowledge of supervisors and managers about a policy/program and their accountability in fulfilling policy guidelines and requirements are crucial to the successful implementation of programs to help troubled employees and their co-workers. The role of supervisors is important in documenting behavior problems and in making a formal documented referral to the appropriate help agents. The formal documented referral can serve to "raise the bottom" to which a person may fall before an attempt at intervention is made. Such a referral can also provide motivation to a drug abuser who is ambivalent about getting help.

With regard to the issue of program integration and the role of supervisors, it is suggested that the ineffectiveness of some EAPs in responding to an organization's possible drug problem might be a result of the ineffectiveness of the performance management and operations management of the organization rather than a problem specific to the staffing or operation of the EAP. A similar statement might be made conceming "Fitness for duty"or reasonable-cause drugscreeningpolicies which depend heavily on the role of supervisors and managers. Thus, a potential weak link in the EAP, the supervisor/manager, is also a potential weak link in a reasonable-cause drug screening program.

While some individuals with drug abuse problems will self-refer to an EAP, many of the cases that are recorded as self-referrals are really individuals who drag themselves into the EAP after a period in which their personal problems and deterioration were clear to people around them who did not intervene, including their supervisors. While self-referral is a possibility, alcohol and other drug problems are fraught with denial by the individual, their family members, and their co-workers. There are cases where supervisors and managers will not take the necessary steps to make an EAP referral when it is appropriate to do so. In some instances,it is because they donothave theknowledge and skills necessary to make a referral. It is also possible that performance problems, including demeanor and getting along with co-workers in a constructive fashion, occur only after the problem is clearly evident to family members. But is also well-known that family members can be enablers, and thereby part of the problem, rather than individuals who will intervene and refer the individual to help. It is because so many individuals with problems do not get help from family members that the workplace is an important route to help for so many who "fall through" the family net. Minimizing enabling behavior by supervisors is critical if their constructive roles in intervention are to be effective (Blum, Roman, Bennett and Weubker, 1988). The analyses that follow address the importance of supervisors relative to the EAP.

The EAP client database and interviews with the EAP coordinators at the various corporate locations indicated minimal supervisory or managerial referrals to the EAP. The survey data, however, presented a more complicated picture of the perceptions and role of the supervisors/ managers vis a vis the EAP.

Of the respondents, 37 percent reported that they have made referral to the EAP, over the time of the program's existence, with another 16 percent reporting that they have encouraged an employee to go the EAP but did not make a formal referral, indicating a majority of the supervisory staff had some association with an EAP referral.

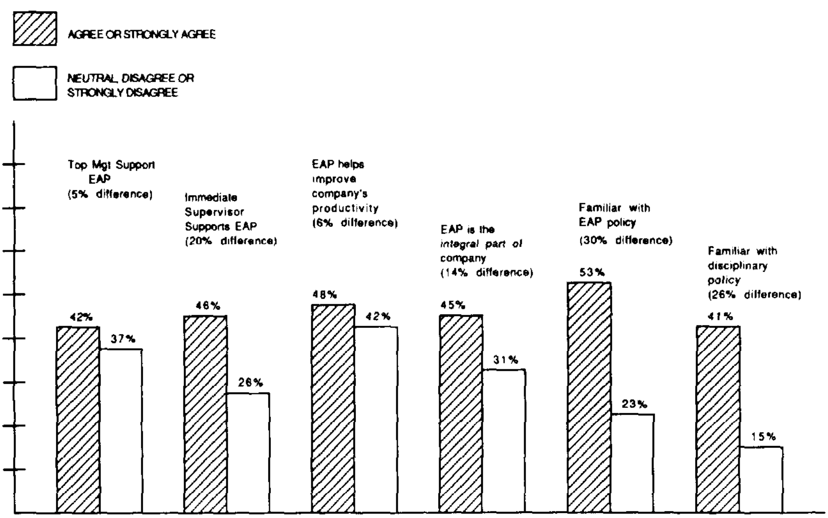
This data reveals that the EAP staff underestimated the extent to which clients who were recorded as "self referral" in the data collection system were actually undocumented supervisory "nudges." While the fact that supervisory referrals are not necessarily recorded as such may not seem that important, it can prove vital in the accurate assessmentandreferral of individuals with drug abuse problems. Drug-abusing employees may "self refer" themselves to an EAP. However, contrary to the popular image, they are unlikely to have "earlier stage" problems than employees who are "supervisory referrals" (Amaral and Cross, 1988). One recovering cocaine abuser who was interviewed referred herself to the EAP for a very late stage problem because she "was sick and tired of being sick and tired." None of her co-workers nor her supervisor were willing to take the steps necessary to put a constructive stop to her performance and demeanor problems through formal EAP referral. If an EAP self-referral denies any drug usage, any job-based problem, or any supervisory motivation to contact the EAP, it is possible that the EAP coordinatormight refer the individual to a community resource that does not have the capacity to identify or deal with drug problems. While it is possible that drug abuse may be revealed through diagnostic tests performed by the EAP, if the staff is qualified or inclined to perform subtle or standardized tests, or by a clinician in the community who has experience with drug abusers, this is no certainty. It is likely that EAP coordinators who do not have access to full information, especially information that there was some impetus from the job situation for the employee to come to the EAP, will make less accurate assessments about drug abuse than EAP coordinators with access to better information that comes through supervisory involvement.

Supervisor/manager referral of subordinates to the EAP is associated with perceptions about the EAP. As shown in Figure 4, referrals are slightly more likely when they perceive top management support, with 42 percent of those who have such a perception having made referrals as compared to 37 percent of those who do not have such a perception. A stronger relationship is observed for the perception of whether one's immediate supervisor supports the EAP, 46 percent of those having such a perception refer as compared to 26 percent of those who do not have such perception. Thus, while other studies have confirmed that top management support of an administrative innovation, such as an EAR, is important at the program adoption stage (Beyer and Trice, 1978; Blum and Roman, 1989b), this data indicates that middle management support is very important during the continuing implementation and program evolution stages.

A strong relationship is observed between the belief that the EAP is integral to the company, with 45 percent of those who have such a belief having made referrals to the EAP as compared to 31 percent of those who do not have such a belief. A weak association between referral and the perception that the EAP helps improve the company's productivity is evident with 48 percent of those with such a perception having made referrals, as compared with 42 percent of those without such a perception.

FIGURE 4

SUPERVISOR/MANAGER PERCEPTIONS AND EAP REFERRAL



Knowledge of EAP and disciplinary policies seem crucial for formal, documented supervisory EAP referrals. Of those who are familiar with the EAP policy, 53 percent have referred subordinates to the EAP as compared to 23 percent of those who are not familiar with the policy. A similar association is found between familiarity with the disciplinary policy, with 41 percent of those who are familiar with the policy referring to the EAP as compared to 15 percent of those who do not report familiarity with the disciplinary policy. Caution is necessary in interpreting the causal direction of policy knowledge and referral behavior, since policy knowledge can obviously result from program utilization. To assume that policy knowledge should lead to program utilization is however a more appropriate design for program implementation. It is important to note that 87 percent of the respondents reported familiarity with the company's disciplinary policy, whereas 56 percent reported familiarity with the EAP policy. This represents a difference of 31 percent. Of the respondents, 60 percent indicated that they had a copy of the EAP policy statement.

While almost half of the respondents reported that they were unfamiliar with the details of the EAP policy and procedures, the data reveal a readiness on the part of the respondents for training about the EAP. Of the respondents, 68 percent agreed that a 2-hour training course about the EAP would be valuable to them as supervisors. Moreover, 59 percent agreed that they would like to improve their skills and confidence in suggesting the EAP to a troubled subordinate; 56 percent agreed that they would like to increase their skills and confidence with regard to coordinating EAP and discipline; and 70 percent agreed that they would like to improve their skills in recognizing an employee who is a candidate for the EAP.

These data indicate a willingness for supervisors and managers to improve their skills with reference to appropriate utilization of EAPs. The supervisors and managers in the company where the survey was conducted do not get any specialized training about the EAP, but they do get training about a range of other topics, some of which mention EAP "in passing." This information is important in combination with the information that there is a relatively low percentage of the employees and a relatively low percentage of the EAP caseload that is represented by alcohol or other drug problems. The overall utilization rate (the percentage of employees who use the EAP in a 12-month period), however, is comparable to the average utilization rate of other large organizations with primarily internal EAPs. The audit revealed, however, that utilization data alone do not adequately describe a program's dynamics.

EAP STUDY

This section of the paper reports results from a longitudinal study of EAPs. During 1984-85, we conducted on-site visits to 439 operating units of organizations, in 66 percent of which we interviewed the internal EAP coordinator/administrator. Of the remaining 34 percent, which were essentially externally contracted EAPs, we interviewed the individual internal to the work organization who was responsible for maintaining and/or monitoring the linkage with the external provider. The data set is based on a carefully selected sample from which we were able to collect some data from over 95 percent of the eligible respondents. The data is representative of EAPs in 1984-85, both internal and external, in private sector operating units (establishments) with 500 or more employees in California, Michigan, Minnesota, New York, North Carolina, and Texas. In 1988, we mailed questionnaires to the internally-based programs, and have been able to account for over 70 percent of the internal programs that we studied in 1984-85 (Blum, Roman, Bennett and Weubquer, 1988).

The data set is very extensive and represents information collected from 3-hour on-site interviews in 1984-85, questionnaires that were left at the interview for self- administration and returned by mail to the investigators, and 1988 mail questionnaires. Only a small portion of the information is reported here. This presentation includes information about the utilization rates and drug screening.

The average overall 12-month utilization rate is 4.5 percent, which is skewed a bit to the right, meaning that the median is less than the mean. On average, 1.5 percent of the work force uses an EAP for their own alcohol or other drug problem in a 12- month period. Two-thirds of the cases list alcohol as the primary drug of choice, but abuse of more than alcohol is common, particularly among employees under 40 years of age. These rates are an underestimate of the portions of the work force that have used the EAP at any point in time. Given low turnover of employees and/or low reutilization of the EAP by the same clients, the EAP utilization rate over a few-year period would be much higher than the average 12-month rate reported here. This is especially relevant when addressing the question of whether EAPs can address workplace drug problems. Given the point prevalence of drug use, EAPs do not seem to scratch the surface of the problem. Such a statistic embodies the rather absurd assumption that all drug cases would be dealt with over a short period of time or simultaneously. However, EAPs appear more effective when examining the number of drug problems EAPs address, on average, over a period of time.

Much prevalence data about drugs confounds "use" and "abuse." EAPs cannot thoroughly address drug use, in other than the prevention in which they engage in through education programs and through dealing with clients who are at high risk for drug abuse but are not abusing at the time they are in contact with EAP. EAPs can, however, address drug abuse and problems related to drug usage, if the EAP is adequately implemented and integrated into the employee culture, the line management, and the human resource management function of the organization. The data indicate that supervisory training and program integration are related to greater utilization for all problems as well as greater utilization rates of EAPs for alcohol and other drug problems. The relationship is greater for training of first line supervisors than of middle managers.

The interface between drug screening and EAPs has been a subject of controversy, with concerns among the EAP community that drug screening in organizations with EAPs would interfere with the EAP's ability to gain the trust of employees and to maintain a caseload. Essentially from this and other studies we find very little drug screening in organizations, other than preemployment applicant drug screening. As in the first study described in this paper, drug screening is relatively rare in actual practice, even in organizations that have policies that permit the screeningofcurrent employees in certain situations, such as reasonable-cause screening, screening after accidents, or screening as part of routine medical examinations.

Preemployment screening does not seem to affect the average rates of drug and alcohol cases dealt with by the EAP. The 1984 data indicate that organizations did not differ significantly in either the proportion of employees or EAP alcohol and drug abuse caseload. Preemployment screening also has limited effects on the 1988 EAP utilization patterns. Preemployment screening in 1984 is associated with a lower overall utilization rate in 1988. There is no significant difference between 1984 preemployment and non-preemployment screening organizations in the 1988 percent of employees who use the EAP for alcohol and other drug problems. The proportion of females who use the EAP for their own alcohol or other drug problem is, however, lower in 1984 preemployment screening organizations. The 1988 utilization rate for cocaine as a primary drug of choice also does not vary with whether there was preemployment screening in 1984-85. The percent of the 1988 caseloads that comprised alcohol and other drug problems does not differ between companies that preemployment screen or screen as part of medical examinations. Marijuana tends to be the drug of choice in the 1988 drug caseload of companies that do drug screen, while cocaine and alcohol as drugs of choice do not systematically vary by whether the organization drug screens or not.

The prevalence of drug screening is not associated with organizational decline in profits nor in numbers of employees. Furthermore, drug screening, either preemployment or of current employees, is not associated with indicators of the relative presence of the "core technology" of EAPs (Roman and Blum, 1988), nor with the EAP's integration into the organization.

OPINION SURVEY

While the previous sections of the paper report information collected from personnel/human resource managers working in a variety of organizations, supervisors/managers employed in multiple locations of a major corporation, and EAP coordinators of internal EAP's and human resource liaisons to external EAP providers, this section of the paper addresses the opinions about drug screening collected from randomly selected individuals. During November-December 1986, a representative sample of 524 adults residing in Georgia were interviewed in a telephone survey. These individuals, 18 years of age or older, represented a 67.5 percent response rate.

Respondents were asked the following item: "It has been suggested that employers should routinely choose employees at random and require that in front of a witness each of these employees would provide a urine specimen which is to be tested for evidence of the employee's drug use." While this item is somewhat double- barreled in terms of drug screening and the witnessing of the specimen collection, NIDA guidelines have included witnessed collection to ensure the chain of custody. Even in this stringent category, half of the respondents either strongly approved or approved of the theoretical practice, 12.6 percent and 37 percent respectively. Among respondents, 28 percent disapproved and 18 percent strongly disapproved, with 4 percent respondingthat they did not know.

Employed individuals were less likely to strongly agree than those who were not employed. Homemakers and retired people are the most likely to agree or strongly agree. We found that sex, race, religion, recency of moving to Georgia, blue collar versus white collar occupations, having closely known someone who was dependent on alcohol or cocaine, education, and income are all unrelated to variation on the opinion. Age, however, is linearly associated with the opinion. Older people are more likely to favor such policy. A discriminant analysis with all of the above variables indicates what is evident in the bivariate analyses, namely that age is the only significant predictor and explains about 10 percent of the variation in the opinion.

Approximately 75 percent of the employed individuals responded affirmatively to the question: Would you be willing, in front of a witness, to provide a urine specimen to a representative of your employer for the purpose of drug screening?" Virtually all of those who strongly agreed with the question above about a drug screening policy, said they would; 96 percent of those who agreed said they would; 67 percent of those who said they disagreed said they would; and 32 percent of those who strongly disagreed said they would. Age is the only variable significantly associated with the willingness to comply with an employer's drug screening request, with older people more likely to say they would be willing to comply.

These data are revealing in the high portions who agree with a hypothetical policy and their willingness to comply. While the data can technically only be generalized to the Georgia population from which the sample was drawn, limitations of generalization from a survey of Georgia adults because of beliefs about the conservatism on these issues of southern residents does not seem warranted. Other opinions in the survey about the disease concept of alcoholism and cocaine dependence were associated with sociodemographic variables in predicted directions, with the magnitudes of agreement with various other opinions consistent with those reported for an earlier study (Caetano, 1986) of Contra County, California residents (Blum, Roman and Bennett, 19891.

The lack of expected demographic associations points to the multidimensionality of the drug screening issue. It means different things to different people. It also means that should a workplace screening program be adopted, it is difficult, though not impossible, for employers and managers to know who will accept or oppose such a policy. Appropriately implemented drug screening programs require that management have information about the opinions of their employees.

Drug screening is not necessarily a technological shortcut to a drug-free or safe workplace. Acceptance of the program by supervisors, managers, and other employees is necessary for it to be effective. A systems perspective of a drug program which is informed about employee opinions may be useful in avoiding pitfalls of isolated programs. Well-planned communication about the aims, procedures, and protections included in drug policies and programs can mitigate against negative or build upon positive sentiments toward drug screening among the employees.

It may be useful to note here that the military has reported decreased rates of those testing positive for illicit drug use over the years that their drug screening program has been in place, and has pointed to this decrease as evidence of the success of drug screening. Yet worldwide surveys based on self- reported use of alcohol in the military have shown that the consumption of alcohol and alcohol-related problems have not similarly decreased over time. While there are some significant decreases in the self-reports between 1982 and 1985, the larger increases in alcohol-related productivity loss between 1980 and 1982 (Bray et al., 1983; 1986) should be considered by those responsible for implementing policies and programs. Further, the evidence from the treatment community of polydrug use and the switching of drugs of choice as different chemicals are more readily available or culturally acceptable should have some influence on the design and implementation of human resource management programs dealing with workplace effects of alcohol and other drug problems.

CONCLUSIONS

This paper has presented data from four projects that are part of a research program on work site management ofbehavioral health issues, of which the research about EAPs and drug screening form major components. A systems perspective for understanding the problems and the management of the solutions, with emphasis on the personnel/ human resources function of organizations and the sociocultural environmental domain in which they operate, was presented. The structural change represented by EAPs and drug screening programs, as well as other organizational responses, can be understood within the context of how organizations perceive and respond to other types ofintrusionsfrom their environment.

The findings from the four studies, some of which are still in progress, represent a picture of work site responses to drug abuse, as represented by several stakeholders, or actors in the system. These actors include personnel/human resource managers, supervisors and managers, EAP coordinators, and a cross-section of employees.

The study of human resource managers suggests that perceived strategic uncertainty with regard to drug abuse and other issues in the sociocultural environmental domain is related to perceived effectiveness in responding to these contingencies, with the associations in this domain stronger than in the regulatory or task domains of human resources management. These data, though preliminary, with more being collected from other organizations, reveal the extent of EAPs and drug screening in one southern State. These data also show that beliefs about the effects of drug screening are associated with the two most prevalent kinds of drug screening programs, preemployment and reasonable-cause, but are not associated with the presence of EAPs. EAPs are associated with the perceived effectiveness in dealing with drug abuse and with alcohol abuse, with reasonable-cause drug screening associated with perceived effectiveness in dealing with drug abuse, but not with alcohol abuse. Preemployment screening is not related to perceived effectiveness in either area.

Surprisingly, there are a substantial portion of organizations that have drug screening programs, albeit mostly preemployment screening programs, but do not have EAPs. Some of these situations may reflect the "managerial macho" a utility company executive is concerned about when organizations rush to adopt drug testing without thinking through the implications and limitations. As this executive who was quoted in Fortune magazine parsimoniously states: "If all you do is drug testing, if you don't train your supervisors to spot problems, or promote your employee assistance program, or communicate clearly and sympathetically with your employees, then you don't have a drug program" (Kupfer, 1988).

Data from the EAP study suggest that organizations that preemployment screen should not get a false sense of security from preemployment screening programs because drug problems do emerge among employees and their family members, the effects of which are not left outside the work site, and show up in EAP caseloads even in organizations that preemployment screen.

This study also indicates the stability and institutionalization of EAPs. EAPs have a core technology that defines them in their organizations and translates into constructive solutions to problems for impaired individuals and others at their work site, in addition to their family members. The data indicate that the more EAPs are integrated into their organizations, the more effective they are in dealing with problems related to drug abuse.

The study of managers and supervisors indicated that the lack of supervisory training and EAP integration into the performance management subsystem of the personnel and line management functions can result in fewer individuals being helped with alcohol and other drug problems through the EAP. The study also showed the readiness of supervisors and managers to improve their skills and knowledge with regard to EAP policy and procedures. Not only could these supervisors be provided with the tools necessary to do their jobs, it would also make sense to hold them accountable for doing their jobs as supervisor/managers in adhering to and implementing organizational policy. While EAP utilization is ultimately voluntary for troubled employees, voluntary and discretionary utilization of organizational policy by supervisors should be discouraged and sanctioned.

Supervisors/managers make more EAP referrals when they are familiar with EAP and disciplinary policy; think the EAP is integral to the organization; and perceive that their own immediate supervisor supports the EAP. While top management support is certainly necessary for the adoption and implementation of an EAP, middle and line management, as well as rank and file support is crucial for an effective program. While the causal direction between EAP referral and program knowledge and support is unclear from these data, the association is clear.

The survey of opinions about drug screening indicates that employees are stakeholders who are apparently ready to participate in organizational responses to drug abuse. These energies can be used as part of the solution in implementing constructive solutions that make sense for particular work settings. Implications from the findings about the lack of predictability of who is in favor of and willing to participate in drug screening suggest managerial attention to the potential pitfalls of drug screening, so as not to underestimate the complexity of the nontechnical issues (i.e. the social issues and opinions of employees), that may lead to hidden and unanticipated costs of drug screening. While public opinion may be favorable toward drug screening, it should not be assumed to be a simple technological shortcut to productivity improvement, nor an alternative to or excuse for bad management.

A systems perspective which views drug abuse within the context of other environmental intrusions that the organization must routinely address to protect its technical core is superior to the perspective of drug abuse as an isolated problem requiring unique and unprogrammed responses. A systems perspective can encourage decisionmakers to adopt and implement comprehensive programs that make sense within the context of their organization's culture, structure, and functioning. While many contingencies must be taken into account before a rational, useful, and cost-effective alcohol and drug use policy and program can be developed, implemented, and integrated into work organizations, there is enough information available to suggest that good comprehensive and effective programs are worthwhile and attainable.

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The Use of EAPs in Dealing With Drug Abuse in the Workplace

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INTRODUCTION

Employee Assistance Programs (EAPs) provide the workplace with systematic means for dealing with personal problems that affect employees'job performance (Blum and Roman, 1989). In this context, "personal problems" refer to alcohol and other drug abuse, psychiatric illness, marital and domestic problems, and, to a limited extent, financial and legal difficulties. Frequently such problems are multiple and interrelated.

Usually based on a written policy statement, EAPs provide a means for supervisors, managers, and union shop stewards to access appropriate expertise and consultation for guidance and help in dealing with subordinates or co-workers whose performance is affected by such problems. Such expertise is present either in the form of an internal EAP coordinator or a staff member at an external contract agency who may be contacted either in person or by telephone. EAPs also provide for employee self-referral, and in numerous instances extend their services to dependents of employees. The purpose of this paper, similar to that of several other papers in this monograph, is to consider the utility of EAPs for dealing with employee drug abuse problems and to examine other aspects of the interface between drug abuse problems and EAPs.

At the outset it is important to note several basic reasons why EAPs have very important roles in dealing with problems of drug abuse in the workplace. First, as has been confirmed in several independent surveys, EAPs of some form are currently in place in work settings that employ at least a third of the United States work force. This estimate is probably low since the survey data do not include public sector employees.

Second, as is indicated in the introductory overview of the nature of EAPs, they offer constructive techniques for dealing with employees' problems. They are fundamentally oriented toward conflict reduction in the workplace. They show strong concerns toward avoiding turnover and replacement costs which fall heavily upon management, labor, and the community.

Third, through a foundation in clearly stated policies and procedures, EAPs also minimize litigation. Their orientation is toward providing due process to employees afflicted by personal troubles.

Fourth, EAPs enjoy the support of both management and labor. From the earliest days of EAP implementation, care has been taken to consult with labor representatives in implementing management-sponsored programs. Labor organizations, both at international and local levels, generally show supportive attitudes and behavior toward EAPs, viewing them as accomplishing their own goals of conserving workers' jobs and careers. Additionally, numerous labor organizations have initiated EAPs and work cooperatively with management through this base of implementation (Roman, 1988).

Finally, and perhaps most importantly, EAPs' emphasis upon constructive rather than punitive treatment of the substance abusing employee is a concept consistent with public attitudes and preferences (Blum et al., 1989).

While EAPs have been designed to function as comprehensive mechanisms for dealing with a broad range of employee personal problems, there has been considerable confusion over applying them to drug abuse in the workplace. Much of this confusion stems from the multiple organizations that have shown concern over the issues of drugs and the workplace. These organizations and individuals represent multiple definitions of drug abuse problems as well as multiple solutions for dealing with these problems.

Attention to employee drug abuse was briefly prominent during the early 1970s, although the concerns were diffuse and not well-defined. (For an elaboration of the events during this period, see Roman and Blum, 1989.) The issue of employee drug abuse was not ignored by employers concerned with job performance and safety issues, and was considered within both fitness-for-duty and assistance-oriented policies. However, as an issue "in its own right," it was relatively dormant during most of the decade of the 1970s and into the early 1980s, the period during which EAPs diffused rapidly and the number of EAP workers expanded geometrically (Blum, 1988; Roman, 1988).

When attention to employee drug abuse was renewed in the mid-1980s, largely under the banner of creating a "drug-free workplace," the proffered solutions to the problem centered on urine-based screening and testing. There were both explicit and implicit assumptions that the goals of dealing with workplace drug abuse problems were to: (1) minimize the entry of illegal drug users into employment and (2) remove from the work force those current employees who were users of illegal drugs. More recently, that position has been moderated. Many discussions about drug abuse in the workplace include suggestions for referrals of employees with positive drug tests to EAPs. They encompass the broader concept that a comprehensive workplace drug abuse policy should include access to EAP services,

METHODOLOGY

In this paper we consider the use of EAPs for dealing with employee drug problems. The basis for the data used here is a 1988 followup of a field study of EAPs carried out in 1984 and 1985. The goal of the initial study, supported by the National Institute on Alcohol Abuse and Alcoholism, was to examine the characteristics and correlates of a sample of EAPs based in private sector company locations. The sampling frame was limited to sites with at least 500 employees. Through a census technique, population lists of all EAPs meeting these criteria were constructed for the six States with the highest level of EAP activity. This activity level was based on a 1981-82 study that focused on external consultants developing EAPs and provided estimates of the numbers of EAPs in each State (Kinman and Roman, 1982).

The six States are: California, New York, Texas, Michigan, North Carolina, and Minnesota. Data were collected from all sites except in Minnesota and New York, where samples of 50 and 80 percent, respectively, were drawn. The research team conducted on-site data collection through interviews with EAP managers or internal liaisons assigned to supervise external EAP contracts. A total of 439 interviews were completed, representing 97 percent of those contacted for an interview appointment. In addition, each of the respondents was given a mailback questionnaire, which included numerous materials to supplement data collected in the interview, and 77 percent returned usable instruments.

In 1988, we supplemented this data foundation with a mail questionnaire to the respondents who were responsible for operating internal EAPs. The purpose was to obtain followup information on program evolution and change. At the time of this writing, this data collection is not fully complete in that all respondents, or their replacements, have not yet been "tracked down." However, complete information on 115 internal EAPs constitutes the data base for this report.

FINDINGS

At the outset, two points should be noted which indicate the growing importance of drug abuse problems in EAP caseloads. First, speaking only in terms of central tendencies in the data, the drug abuse caseload is, on average, more than a third of the total substance abuse caseload. Conversely, employee alcohol problem cases represent slightly less than two-thirds of the substance abuse caseload.

Therefore, since the average representation of substance abuse overall in these EAP caseloads is between 30 and 40 percent, employee drug abuse cases represent at least 10 percent of the overall EAP caseload.

Based on averages rather than on descriptions of specific programs, the composition of the employee substance abuse caseload in 1988, by primary substance of choice of the employee referral, is:

- Alcohol problems-between 60 and 65 percent
- Cocaine or crack-between 21 and 26 percent
- Marijuana-between 8 to 10 percent
- Other illegal drugs-between 6 to 8 percent
- Diazepam (Valium)-between 2 to 4 percent
- Other prescription drugs-between 3 to 5 percent

Cocaine is clearly the major nonalcohol drug EAPs deal with. This point is extremely important in light of the pervasive image that EAPs' substance abuse focus is exclusively upon alcohol and that mechanisms other than EAPs must be designed and implemented in order to effectively deal with employee drug abuse problems. Indeed, as we pointed out when examining data from the initial survey (Blum and Roman, 1986), EAPs contrast with random drug screening. EAPs are not merely identification and referral mechanisms available within a work group only "at random"— they are available every working day of the year.

In terms of statistical central tendencies, a comparison of the 1988 data with that collected in 1984-85 indicates an approximate doubling of nonalcohol drug representation in the substance abuse caseload. This figure demonstrates that EAPs can be and have been responsive to drug abuse problems in the workplace and that their potential in this regard is underestimated.

The research variable of focus in the remainder of this paper is the proportion of employee drug problem cases in the EAP caseload during the 12 months prior to the 1988 data collection. This measure may be seen as the "drug abuse emphasis" within the EAP. It represents both the extent to which EAP is seen as viable for dealing with employee drug abuse cases as well as the extent to which it is penetratingthe drug abuse problem within the organization.

Several caveats should be kept in mind when reviewing these materials.

- The data are preliminary, and only bivariate relationships are reported; these could disappear when controls are introduced once the complete data set is collected and analyzed.

- The data are based only on internal EAPs, and thus may tend to overestimate the extent of EAP attention to drug abuse. The logic behind this supposition is that drug abuse emphasis is associated with supervisory involvement in EAP referrals, which generally tends to be less in externally based EAPs.

- The variable under examination does not indicate the extent to which EAPs effectively reach employed drug abusers in particular settings; the measure used here is not based on the size of the caseload, nor does it reflect the actual presence or distribution of drug abuse problems in a particular work force.

- The measure used here is only an indirect index of effectiveness; our other research has shown that alcohol and drug abuse cases generally are back on the job and performing adequately at about a 70-percent rate at 1-year followup from the time of referral. The measure used here thus offers a rough guide to the extent to which resources are being allocated toward providing services to aid in such rehabilitation for employees who are abusing drugs other than alcohol. Indeed, there is a significant positive association between the extent to which the EAP deals with nonalcohol substance abuse cases and the extent to which substance abuse is represented in its overall caseload

The data presentation that follows is centered on the Pearson correlation coefficients between the proportion of the caseload that comprises non-alcohol employee drug abuse problems and several other sets of variables: general workplace characteristics, drug screening experiences and attitudes, structure and change found within the EAP, the core technology of EAPs, and clinical and referral features of EAPs. The term "drug abuse caseload" refers to the proportion of drug abuse cases in the EAP's substance abuse caseload. Statements of statistical significance indicate that the correlation is significant at the 0.05 level or better. A trend refers to a relationship that approaches but does not meet this level of statistical significance, i.e., between 0.06 and 0.10. Concluding comments follow regarding the interface between EAPs and employee drug abuse issues.

General Workplace Characteristics

Workplaces undergoing either growth or decline in their work forces might be expected to emphasize drug abuse problems. This is not the case. In terms of change in overall work force size, there is a trend toward a greater drug abuse caseload in companies with work force stability.

A similar pattern is found in the organization's economic position. There is a trend toward a greater drug abuse caseload when the company's profitability is growing or stable rather than declining.

There is a strong positive correlation (.30) between drug abuse caseload and the proportion of the work force that is unionized. This correlation may reflect the cooperation of labor unions with management in dealing with drug abuse problems.

Many surveys indicate that concern with drug abuse issues appears to be positively related to organizational size. In these data, however, there is no relationship between drug abuse caseload and the size of the work force eligible for the EAP's services.

There have been many concerns that EAPs dealing with drug abuse problems tend to be more oriented toward male than female employees. In these data, however, there is no relationship between drug abuse caseload and the gender makeup of the work-force.

Associations With Drug Screening and Testing

The drug abuse emphasis in the EAP is related to drug screening and testing. Drug abuse caseload is significantly higher when a drug screening policy is present, and when some or all job applicants undergo urine screens for drug use.

There is a trend toward lower drug abuse caseloads when random screening of all or some employees is mandatory. There is also a trend toward lower drug abuse caseloads when urine drug screening is part of current employees' routine medical examinations. These findings could be interpreted in several different ways. They may indicate random screenings effectiveness in deterring employee drug use. They may indicate a lower use of the EAP when these mechanisms are in place,

These relationships are evidently complex, for there is a larger drug abuse caseload when the company performs urine drug screening "for cause," i.e., when there is reasonable suspicion that an employee is not fit for duty. Furthermore, there is also a larger drug abuse caseload when the company routinely performs tests for drug use of accident victims after workplace accidents. Finally, while a relatively rare practice in these survey data, in those few instances where confidential peer reports are used as the basis for performing drug tests, there is a trend toward a larger drug abuse caseload.

The data collection also involved consideration of employers' attitudes toward several drug screening issues. The data reveal a combined profile. Positive attitudes toward use of the EAP in conjunction with drug screening were coupled with fairly tough attitudes toward employee drug abuse. Thus, the image that EAPs and drug testing represent distinctively different ideologies toward employee drug abuse may be incorrect. Drug abuse caseload is significantly positively associated with agreement with the statement, "Drug abuse is a major problem among employees in organizations today." There is a positive association between the caseload and agreement with the statement, "Positive drug screens of current employees should be referred to the EAP." Further, drug abuse caseload is significantly positively associated with agreement to the statement, "Publicity about drug screening has increased self-referrals for alcohol and drug problems."

This latter finding is qualified, however, by the significant positive association between drug abuse caseload and agreement with the statement, "Publicity about drug screening has decreased employee trust of the EAP."

There are also significant positive associations between drug abuse caseload and agreement with each of the following statements:

- "Employers should dismiss employees who refuse to submit to drug tests."

- "Employers should refuse employment to any job applicant who refuses to submit to a drug test."

Companies with no drug screening whatsoever reported a significant negative association between drug abuse caseload and agreement with the statement, "The company does not screen because of the potential negative impact on morale." In other words, when this reason is present as a basis for not having drug screening, drug abuse caseload declines. Similarly, there was a negative association approaching statistical significance (.08 level) between drug abuse caseload and agreement with the statement, "The company does not screen because of employee opposition."

EAP Characteristics and Change

Generally, we find a higher drug abuse emphasis within EAPs that are integrated into supervisory management. There is a distinct trend toward an increased drug abuse caseload when respondents report that EAP training of first line supervisors has improved over the past 4 years. This trend also holds true for reported improvement in training middle managers about the EAP. There is also a trend toward an increased drug abuse caseload with reported improvement in top management support of the EAP.

Drug abuse caseload is not, however, affected by reported change in union support of EAPs in locations where a union is present. But the perceived adequacy of union support for the EAP in these locations is positively related to drug abuse caseload. Improved EAP case recordkeeping is positively associated with drug abuse caseload.

In spite of concern that inadequate insurance coverage is a barrier to use of the EAP for substance abuse problems, drug abuse caseload is not related to reported improvements in insurance coverage for substance abuse treatment or to perceived adequacy of this insurance coverage.

Drug abuse caseload is also not related to reported improvements in education of the work force about the EAP. However, there is a positive trend toward such a relationship in the reported adequacy of such education.

Drug abuse caseload is significantly but *inversely* related to reported improvements in EAP staffing. Larger drug abuse caseloads occur when staff adequacy reportedly deteriorates. There is no relationship between drug abuse caseload and reported current adequacy of EAP staff to cover EAP services.

While drug abuse caseload is not related to improved medical department support, it is strongly and significantly related to reported current adequacy of medical department support. Support from personnel/ human resources appears equally, if not more, important. There is a distinctive positive relationship between drug abuse caseload and reported improvement in support for the EAP from the organization's human resources function.

Drug abuse caseload is markedly larger where there are formalized Preferred Provider Organization (PPO) arrangements, and where there are formal strategies in place for the managed care of alcohol, drug abuse, and mental health problems.

Respondents were also presented with a series of items in which they were asked to estimate the importance of various factors in their organizational decisionmakers' continued support of the EAP. Only one of these items showed a significant positive association with drug abuse caseload: "Preventing litigation in regard to wrongful discharge." A second item approached statistical significance (.07 level): "Providing management of health care costs related to employee alcohol, drug abuse, and mental health problems."

The Core Technology of EAPs

The "core technology" of EAPs comprises six strategies or techniques regarded as the central defining features of EAPs. Knowledge of these strategies forms the basis for the credentialing of EAP professionals. These techniques are: (1) use of job performance deterioration to identify troubled employees, (2) availability and provision of consultation to supervisors and managements about EAP policy, (3) constructive confrontation, (4) microlinkage of employees with appropriate help-sources, (5) integrating relationships between the workplace and treatment/ counseling providers, and (6) a constructive organizational emphasis on dealing with substance abuse problems (Roman, 1988; Roman and Blum, 1988). Several items were included to measure the association between the presence of EAP core technology and of drug abuse caseload.

Significant positive associations were found between drug abuse caseload and the following statements:

- “Supervisors and managers readily contact the EAP staff for consultation about how to use the EAP policy and procedures when they believe they have a case appropriate for the EAP.”

- “EAP staff coaches supervisors, managers, or union reps in the use of constructive confrontation.”

- Within the boundaries of confidentiality, an effortismade to prepare the supervisor for the employee’s return to work.”

- ‘The EAP is an integral part of the system of progressive discipline.”

- Within the organization, EAP staff are routinely called upon for advice about issues other than those directly involving the EAP.”

A significant *negative* association was found between drug abuse caseload and the statement: “Various community resources are considered for an employee referral to maximize the match between a resource and the employee’s problem.”

There was distinctively no relationship between drug abuse caseload and these other aspects of supervisory relationships and the EAP:

- When an employee does not readily admit to a problem, constructive confrontation is used by supervisors and managers to motivate the employee’s use of the EAP.”

- “Constructive confrontation involves the presentation to the employee of documented evidence of substandard performance.”

These data indicate the importance of EAPs’ integration into supervisory management for an emphasis on drug abuse within the substance abuse caseload. The distinctive element of the core technology is the availability and provision of consultation to supervisors/managers by an EAP professional. Constructive confrontation did not emerge as important. This finding may reflect either the relatively low extent to which such a formal procedure is used, or the extent to which supervisory consultation may sidestep the need for a constructive confrontation. There is no clear interpretation of the negative relationship between the microlinkage of employees to treatment and the drug abuse emphasis within the substance abuse caseload.

Clinical and Referral Aspects of the EAP

An EAP's dealing with drug abuse is related to its overall dealing with substance abuse. Drug abuse caseload is significantly positively associated with the total substance abuse caseload. There is, however, no relationship between drug abuse caseload and the EAP's success at early identification, since drug abuse caseload is not associated with substance abuse caseload in the early, middle, or late stages of substance abuse problems.

Reported time required to deal with substance abuse cases is distinctly related to drug abuse caseload. Respondents were asked how much of their time was required to deal with substance abuse cases relative to nonsubstance abuse cases. The data indicate that the more time substance abuse cases reportedly require, the more likely drug abuse cases are found in the substance abuse caseload. This finding may reflect the greater "payoff " EAP professionals feel they receive by devoting greater time to serious employee problems such as illegal drug abuse.

There is a trend toward a positive association between drug abuse caseload and the proportion of substance abuse cases that come to the EAP via supervisory referral based on a performance problem. There is, however, a significant *negative* association between drugabuse caseload and the proportion of substance abuse cases that come to the EAP through informal supervisory referral without a documented performance problem. This finding appears to further support the importance of the EAPS' integration into supervisory management for employee drug abuse cases to be a meaningful part of the EAP caseload.

Although only approaching statistical significance (.06 level), there is a parallel negative relationship between drug abuse caseload and the proportion of nonsubstance abuse cases that come to the EAP through this informal supervisory referral route.

There is no relationship between drug abuse caseload and the proportion of substance abuse cases that enter the EAP via self-referral.

There is, however, a positive association at the .08 level of significance between drug abuse caseload and the proportion of substance abuse cases coming to the EAP via union referrals.

There is essentially no relationship between drug abuse caseload and the proportions of substance abuse cases associated with varying outcomes (e.g., return to the job with satisfactory performance, left the company, etc.).

These data provide an overall profile of the factors associated with the level of "drug abuse emphasis" in the caseload of a sample of internally-based EAPs. The pattern suggests that the more the EAP is geared toward involving supervisory management, the greater the extent of drug abuse emphasis. This finding confirms our general impressions from research that it will be very difficult to obtain significant numbers of employee drug abuse referrals through EAP mechanisms that are not integrated into organizational management and that rely primarily on self-referral.

The significant exception to this generalization stems from our observations of a number of self-referred drug abusing employees within a large firm. In these instances, the self-referral reflected:

- Supervisors and peers confronting or referring the employee for assistance

- A self-survival move by the drug abusers, who in these instances had reached fairly late stages of addiction.

Thus, rather than representing the supposedly desirable early-stage problem, where the social audience has no awareness, self-referrals can represent severe late-stage difficulties, where the social audience is aware of the problem but reluctant to take action.

Such a situation describes an EAP that is not well-integrated into organizational functioning.

CONCLUSIONS

Building on the above data bases, we offer concluding comments about three general areas of confusion and ambiguity associated with the relationship between EAPs and workplace drug issues.

One of the most obvious problems in dealing with drug abuse in the workplace is the mixed messages offered to both employers and employees regarding the intentions, philosophy, and assumptions underlying efforts to deal with work site drug abuse.

We have conducted other research focused on public attitudes toward drug use and abuse, and toward its treatment and management. These data, reported in detail elsewhere (Blum, 1989; Blum et al., 1989), indicate that the public is unexpectedly receptive toward dealing with drug abuse problems constructively. Readiness to generalize and expand the EAP solution beyond alcohol was unexpectedly supported in a 1986 survey conducted among a stratified random sample of 564 adults representative of the State of Georgia. In that survey, we asked whether the respondents believed that alcoholism could be treated successfully; 93 percent responded positively. A follow-up question asked whether individuals dependent on cocaine could be successfully treated; fully 82 percent of the respondents responded positively. As researchers, we were genuinely surprised to see this level of positive reactions to constructive interventions directed at drug abuse problems. We have, in fact, been told by treatment professionals that the level of such optimism would probably have been considerably lower had we surveyed a sample of their fellow practitioners. This finding indeed describes a readiness to use the already successfully diffused and adopted EAP model to deal directly with drug abuse in the workplace. By inference, there may be considerably more public support for constructive approaches to deal with employee drug problems rather than removing these individuals from the workplace, and essentially, from work roles.

Second, workplaces are increasingly shying away from random drug screening and its various legal implications, accepting instead a yet-evolving philosophy of "screening for cause." This strategy strikes close to EAPs' core technique of identification on the basis of deteriorating job performance, but it is not an identical strategy. Depending upon how the policy is introduced, it may suggest that supervisors step out of their normal routines of monitoring performance and output, The search for a "cause" to trigger screening of a suspected drug abuser can become a primary motive rather than a routine supervisory matter. This can occur within or can create a highly charged atmosphere which contrasts sharply with the "crucial balance" of identifying a work problem while offering constructive and humane assistance. The encouragement of suspicion borders on a police model rather than a supervisory model. It recalls concerns in the earliest days of EAP diffusion that they could be inadvertently designed or perceived as "witch hunts" among the work force. Such a design and/or perception may in turn encourage grievance and litigation rather than joint efforts toward problem resolution and employment maintenance.

Finally, preemployment screening for illegal drug use has become very widespread. This increase affects drug problems for which the community will become ultimately responsible, likely in a manner that will far exceed the costs of early intervention. The philosophy and assumptions ofpreemployment screening curiously contradict the assumptions of on-the-job screening "for cause." To an extent, preemployment screening without informing or re-testing the prospective employee with a positive illegal drug screen result is a regression to a philosophy of corporate non-responsibility for the welfare of the community. As preemployment screening becomes increasingly widespread, the wisdom of such a strategy without concern for who might eventually pay for problems of the chronically unemployed and disenfranchised deserves more thought,

In sum, EAPs can offer much in dealing with drug use and abuse problems in the workplace. Much progress has been made in broadening the understanding of the need to incorporate solutions beyond drug screening. The following implications and recommendations can be drawn from these observations and from available data:

- EAPs have diffused successfully in a context of voluntarism; and employers have adopted them without external constraints. The merits of this voluntary strategy should be carefully considered before moving EAPs into a regulatory environment.

- Standards for EAP quality should be further developed and enforced through EAP professionals, who are rapidly emerg-inginto a recognized paraprofessional group including recognized professionals.

- Communication among NIDA policy professionals, those involved in the refinement and diffusion of drug testing technology, and the EAP community (with particular attention to including EAPs in research designs) should be facilitated through conferences, shared publications, and other communications.

- Research projects should be developed to assess the potentials of different strategies with the "hard-to-reach" work forces(e.g., construction, mining, service workers) that likely employ larger proportions of drug users.

- Carefully designed research on the modes of referral most effective for reaching employed drug abusers should continue and develop further. It should use samples upon which the appropriate scope of generalization is clear.

- Efforts should be developed and supported to upgrade the quality of existing EAPs. A related goal should be an increase in employers' consciousness regarding the value of dealing directly with employed drug abusers within the EAP context.

- Research should carefully assess the programmatic designs whereby drug screening efforts are most successfully integrated with EAP activities, with a goal to maximizing organizational productivity and predictability as well as employee welfare.

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Emerging Issues/Research Directions

Revisiting the Role of the Supervisor in Employee Assistance Programs

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INTRODUCTION

Since the early conceptualization of occupational alcoholism programs, supervisors have been at the heart of the unique identification, confrontation, and intervention that we have now come to call Employee Assistance Programs (EAPs). However, workplace strategies for intervening with drug and alcohol problems are entering new phases of development. As the EAP field evolves over the next decade, it has an excellent opportunity to revisit the dogma surrounding the supervisor role, and examine its efficacy. Numerous anecdotal accounts suggest the demise of constructive confrontation, supervisor referrals, and supervisor training. No adequate empirical data are present to prove or disprove these claims; however, it is apparent that supervisors' roles and involvement in EAP strategy have diminished in many quarters. The EAP, therefore, faces at least a conceptual challenge: How essential is the supervisor to the EAP and to what extent can we conceptualize and operationalize an EAP without active supervisory participation? Will the traditional models of constructive confrontation hold up, or will supervisors become inconsequential and unnecessary to the overall EAP strategy?

There has been unparalleled growth and development of EAPs over the past several years, while at the same time supervisor involvement in EAPs has diminished considerably. More intense involvement of the supervisor is essential to the success of the EAP and the role of the supervisor must be considerably broadened as the EAP matures and develops. These contentions are based on conceptual clarity and empirical findings. This paper summarizes the essential research on the role of the supervisor and the issues and obstacles they face in their essential EAP role. The final sections will explore future directions for supervisor participation in EAPs.

CONCEPTUAL FOUNDATION OF SUPERVISOR INVOLVEMENT IN EAPS

The conceptual core of the EAP was constructed within a unique environment containing a set of elements and characteristics valuable in identifying and moving the alcoholic (employee) into treatment. Unlike other settings-such as the health and social service system, or even the family—work environments, formal organizations have existing mechanisms of (1) observing performance, (2) setting standards relative to performance, and most importantly, (3) possessing the sanctions to enforce unacceptable behavior. Thus, work settings possess relatively powerful tools with which to take action against drug and alcohol problems. By contrast, other institutions must rely almost exclusively on informal and effective relationships. EAPs have used these tools and environmental context to identify and intervene in deteriorating job performance through "constructive confrontation" (Trice, 1966; Trice and Roman, 1978). When facing evidence of impaired employee performance, supervisors—as managers and overseers of productivity standards-can use constructive confrontation to identify and confront affected employees. Through the EAP, they can offer these employees rehabilitation for their substance abuse problems.

Identification, documentation, and referral are thus central to the role of the supervisor. Supervisors, therefore, have constituted an essential core of the EAP (Googins and Kurtz, 1980; Hoffman and Roman, 1984). The "model" within which the supervisor role is depicted, appears to constitute an ideal match between the natural structures and operations of the workplace, and the needs of the drug and alcohol field to have a sanctioned form of early identification and intervention. Such a sanctioned intervention provides a mechanism for breaking down denial which is at the heart of the addiction problem and tends to impede normal intervention.

Contructive intervention recognizes the key role of the supervisor in work organizations. It offers a progressive process for getting at drug and alcohol problems. The supervisor is the gatekeeper and, thus, is ideally positioned and charged by the organization to guide the employee toward achievingits goals. Problems such as drug and alcohol use, which spill over into normal workday routines and impact both individual and work group performance, need correction through supervisor intervention. The EAP and its constructive confrontation strategy, while developed for the benefit of the employee, are at the same time an alternative resource for the supervisor in managing the problem. Without the EAP, the supervisor and organization must rely either on a disciplinary route or a strategy of benign neglect—neither of which offers the organization much return on their investment in that employee.

The strategy of supervisor involvement opens up an alternative manner for dealing with performance problems. A progressive series of steps begins with the supervisor identifying a performance problem, then sitting down and discussing it with the employee. Next, depending on the readiness and willingness of the employee, the supervisor moves through the progressively tougher steps of constructive confrontation and discipline. Trice and Sonnenstuhl (1987) concisely summarize the process.

> The constructive part of the informal discussions: (1) expresses emotional support and group concern about the employee's welfare; (2) emphasizes that group membership can be maintained if the employee conforms in the future; and (3) suggests an alternative course of behaviors the employee can take to regain satisfactory performance.
>
> The confrontational part of such discussions: (1) reiterates internalized values upheld by the working groups (in this case, expectations of work performance); (2) reminds employees that they are not fulfilling these expectations and that sanctions will follow if expectations continue to be violated; and (3) establishes some social distance between the deviant employee and those group members who are meeting expectations.

Constructive confrontation, therefore, relies on the presence of a supervisor who is: (1) knowledgeable, (2) ready to exercise the role of supervisor/manager in confronting poor job performance, and (3) constructively offers the rehabilitative assistance provided through the EAP. By working with both the EAP and the organization's disciplinary procedures, the supervisor is both equipped and positioned to successfully resolve drug and alcohol problems in the best interests of both employee and employer. This delicate balance between discipline and rehabilitation is a unique feature of intervention in substance abuse, and it appears to be working with some degree of success. A number of studies report that the supervisor does react to employees whose work performance is deteriorating (Trite, 1965; Kurtz et al., 1980), and, when adequately trained and knowledgeable about the program, the supervisor does intervene and carry out the proper role (Googins and Kurtz, 1981).

Without the supervisor, the EAP becomes a counseling program similar to any community-based program dealing with emotional, family, and substance abuse problems. What differentiates the EAP is not only its organizational identity and location, but its incorporation of the unique properties of the work environment, which allow a more effective identification and intervention with substance abusers. However, work institutions and their policies are not the ones responsible for such intervention-rather, supervisors are charged with the role and responsibility for monitoring and evaluating job performance. Take away the supervisor and you have but a traditional counseling program limited by its reliance on the willingness of the individual to seek help. To those in the substance abuse field, this in effect eliminates the majority of those addicted and unable to get beyond the denial stages of the problem.

In summary, the appeal of the EAP rests largely on the logic and simplicity on which the programs are based. Supervisors, in line with their primary roles and responsibilities, monitor and evaluate performance. To the extent that drug and alcohol problems enter into the workplace from external environs (and there is ample evidence this does occur on a regular and predictable basis), the supervisor is positioned and charged to identify and intervene along procedures carefully proscribed by corporate and legal policy. If the employee's job performance becomes impaired, that employee is identified and referred to the EAP for treatment. Virtually no EAP today would dispute the centrality of this conceptualization or deny its importance.

RESEARCH FINDINGS ON THE ROLE OF THE SUPERVISOR

A relatively healthy body of research exists within the EAP field on the role of supervisors. In the context of EAP research, the depth and breadth of studies focusing on the supervisor is quite robust. However, much of the research took place in the early stages of the occupational alcoholism and EAP movement, and few additions to this body of knowledge have been made in the past 5 years. Moreover, the nature of EAPs has changed dramatically during this same period. Consequently, a paucity of research exists today on the supervisor role. This scarcity is problematic, considering the reputed decline in supervisor referrals and participation in EAPs. Perhaps the best method of reviewing the existing literature is to examine two major areas: (1) the role of the supervisor and (2) the job performance/constructive-confrontation models.

Role of the Supervisor

The role of the supervisor is one area where research has shed considerable light. The supervisor has been identified as the pivotal individual in identifying, confronting, and referring employees whose work performance has deteriorated (Googins, 1978; Googins and Kurtz, 1980; Trice and Beyer, 1984). However, while supervisors are a crucial link between employees and EAPs, they have often been reluctant to refer employees to programs. Trice (1966) identified three barriers to supervisors referring employees. They are: (1) a desire by supervisors to help the alcoholic worker on their own, (2) a belief that formal policy should only be used as a last resort, and (3) supervisors' personal attempts to help the troubled worker.

Another study also identified several barriers to supervisors' use of an alcoholism program (Googins, 1978). This study, which focused on two domains of variables—knowledge and attitude—identified three barriers to the supervisor referring problem employees to an alcoholism program: (1) supervisors' attitudes towards perceived effectiveness of the EAP, (2) factual knowledge of the alcoholism program, and (3) attitudes towards the supervisor role. Similarly, Hoffman and Roman (1984), collected data from 84 supervisors and examined the effects of supervisory style and experientially-based frames of reference on organizational alcoholism programs. They found that supervisors' attitudes towards an EAP and their supervisory style were significantly associated with the perceived degree of help given individuals referred to the alcoholism program.

Bayer and Gerstein (1987) have recently considered ways to adapt traditional psychosocial models of prosocial behavior to assist the supervisor overcome barriers to using EAPs. They contend that EAPs are only effective to the extent employees utilize their services. They further contend that supervisors, in their role as referral agents, are primarily charged with the responsibility of identifying and intervening with problem employees. The authors propose a bystander intervention model (Piliavin et al., 1981) and an equity model of supervisor behavior (Walster et al., 1978) as frameworks for better understanding some key variables in supervisor intervention practices. The key variables which impact supervisors' likelihood to intervene include: (1) the nature of the situation, (2) characteristics of the supervisor and employee, (3) the costs of helping, and (4) the techniques used by supervisors during the intervention.

The Job Performance/Constructive Confrontation Model

Considerable research literature has also focused on the basic model underlying supervisor training—the job performance model. The job performance model consists of: (1) defining program policy, (2) emphasizing the degree of management support for it, (3) explaining the role of the supervisor in implementing it, and (4) demonstrating how it can be integrated into supervisors' existing responsibilities for employee job performance(Sonnenstuhl and Trice, 1986). The rationale for this model lies in previous attempts to train supervisors in the symptomatology of alcoholism. These attempts failed to adequately identify alcoholics exhibiting symptoms. They frequently led to conflict between supervisors and employees. In addition, they did not help supervisors identify other problems areas (i.e., marital, family, emotional, financial) which also contribute to poor performance (Martin et al., 1986; Roman, 1981).

Within the job performance model, the supervisor is trained to identify troubled employees on the basis of deteriorating job performance, and then intervene with constructive-confrontation (Donovan et al., 1977; Kellerman, 1970; Paredes, 1974; Trice, 1962; Trice and Roman, 1978). Several studies have examined, in detail, the effectiveness of the constructive-confrontation strategy (C.F. Hilker et al., 1972; Trice and Beyer, 1981; Trice and Beyer, 1984). Generally, these studies conclude that this intervention strategy leads to increased employee acceptance of treatment and a subsequent improvement in their overall job performance.

Groenveld and Shain (1985) examined constructive confrontation on a more microscopic level by analyzing outcomes in 37 confrontation processes. The study revealed wide disparities between the problem employees and their supervisors. The overall supervisor-subordinate appraisal demonstrated major disagreements between the two groups on job performance assessments at the corrective interview and at the follow up. Generally, supervisors continued to perceive the performance of their employees as more impaired than did the employee group. This ineffective communication between the two groups opens up a number of future research projects, particularly ones that would be able to link the absence of training to poor communication and ineffective intervention by supervisors. If nothing else, it focuses more closely on the corrective interview at the heart of the EAP process.

Certainly, one of the strongest set of arguments favoring constructive confrontation is its reported success. Despite the repeated flaws of the design and methodology reported by Kurtz et al. (1985), efficacy of these coerced or supervisory referrals have been consistently reported as high. Franco (1960), using a time series (before-after) design to assess outcome, compared indices of job maintenance, supervisor ratings of performance, and sickness and absenteeism 3 years before and 4 years following EAP intervention. His reported improvement rate of 72 percent has been repeated in other studies (Hilker et al., 1972; Asma et al., 1971). In later studies, Smart (1974) and Moberg (1974) compared groups of employees who voluntarily referred themselves for treatment with those who were pressured by their supervisor. Both studies reported that the coerced employees had the same outcomes as the voluntary group. Heyman (1976), examining a group of employees from five different work organizations with varying degrees of coercion, reported a significant relationship between constructive confrontation and improved work performance "for those whose pre-program performance had deteriorated." These findings were virtually repeated by Freedburg and Johnston (1979) in their study of 365 alcoholic clients in a Canadian Study.

EFFECT OF CHANGING EAP ENVIRONMENT ON SUPERVISOR INVOLVEMENT

Research findings clearly point to the necessary and effective role of the supervisor in EAPs. However, the changing nature of the EAP and its work environments forces the EAP field to restudy the supervisor role in new contexts. The traditional model that worked well under the industrialized workplace of the 1960s may not be adequate for the workplace of the 1990s. To better understand some of these new dimensions, it might be helpful to examine two major issues of particular interest to the EAP and supervisor involvement: self-referral and drug testing.

Self-Referral

Despite the near-sacred role of the supervisor in the EAP, a growing phenomenon has been observed over the past several years; supervisor referrals have apparently declined dramatically, both in percentage of cases and in absolute numbers. Self-referrals, by contrast, have increased.

The literature describes several different types of referrals. Erfurt and Foote (1977) described supervisor referrals as a formal arrangement by a supervisor: 1) who is not satisfied with an employee's job performance, and 2) wants the employee to receive help from an EAP. Informal referrals, on the other hand, occur when supervisors, who are uncomfortable with the formal referral process, refer employees informally to the EAP (Heyman, 1976). Finally, self-referrals occur when employees initiate their own contact with an EAP (Martin et al., 1986).

Martin et al. (1986) studied the relationship between referral types, work performance, and employee problems. This descriptive study of 1,340 clients who used an EAP program during a 3-year period, found that supervisor referrals accounted for only 4.7 percent of the total referrals to EAPs; informal referrals, however, accounted for 9.6 percent. The largest number of referrals to EAPs were self-referrals, accountingfor 85.7 percent of the total referrals. The mostcommon work performance problem cited through supervisor referrals was absenteeism. For informal supervisor referrals, awareness of slipping performance was the most commonly noted reason. For self-referrals, interpersonal relations problems were most frequently cited. Among employees with alcohol and drug problems, more were self-referred than either formally or informally referred by supervisors.

The trend away from supervisor referrals and towards self-referrals is confirmed in a recently conducted informal telephone survey with five EAPs: Digital, Honeywell Bull, New England Telephone, N.B.C. at Burbank, and the National Maritime Union. Supervisor referrals at these locations average 30 percent; 3 to 5 years earlier, 70 percent of referrals were supervisor initiated. Despite the phenomenon's universality, little is known about this process. Some question exists whether there is genuine self-referral.

Obviously self-referrals were motivated to seek help by other forces. In some cases, their supervisors leaned on them for impaired performance that could not easily be ignored. In other cases employees may have asked their supervisors' or fellow workers advice and were indirectly referred. Many observers agree that there is a high likelihood that the majority of self referral clients actually come from supervisors or union stewards (Trice and Beyer, 1981).

Sonnenstuhl's process research into self-referral is one of the few explorations into this phenomenon. He theorized that the decision to refer oneself to the EAP resulted from "a complex network of both formal (i.e., supervisory discussions, medical routines) and informal (i.e., cultural triggers, employee network) social controls." In effect, the notion of a self- referral appears to reflect socialization andinteraction between the employee and other people.

Research literature on constructive confrontation presupposes the supervisors' readiness and ability to carry out their appropriate roles. However, EAPs have had only limited success in getting supervisors to intervene and refer employees to the EAP. Only 2-3 percent of troubled employees are currently estimated to ever receive EAP services, leaving the remaining 8-10 percent of the affected workforce untreated (Wrich, 1980; Both, 1981; Masi, 1984). While Bayer and Gerstein (1987) hypothesize that a lack of information and access to EAPs contribute to this low referral and utilization rate. No research data as yet support their contention.

Thus, self-referral has apparently become the model referral type in most EAPs. However, the acceptance and rationale for the primacy of the self-referral has become troublesome to some within the EAP field. Critics state that current trends are likely to impact program effectiveness. They suggest the traditional emphasis of EAPs—that of alcohol and drug abuse—is being supplanted and diminished by the increasing broadbrush approach (Roman and Blum, 1985). As a result, employees who are becoming dependent on alcohol and drugs are now less likely to be identified (Roman, 1981). This criticism can be linked to studies from other settings of coercion in alcoholism. For instance, in driving-under-the-influence programs, the voluntary or self-referred client is much more likely to drop out of treatment than the coerced client (Rosenburg and Liftik, 1976). Heymen's study of coercion with employed populations cast even more serious doubt about the concept of self-referral itself:

> The concept of self-referral itself is a muddied one and in the general casework literature no significant relationship has been found between self referral and continuance. A person referred involuntarily to an alcoholism program must sooner or later achieve his own motivation to remain in the program. But even if "self-referred", he may have taken this step only to escape coercion with his supervisor . . . Or he may refer himself under pressure from family and friends.

Determining the motivation for referral—if left solely to a person's expressed reason for seeking treatment—is impossible. This obstacle, coupled with the psychodynamics of denial, casts considerable doubt on any possibility of true self-referral for substance abuse. Trice and Sonnenstuhl(1987) see the concept of self-referral as a cultural distinction basic to the functioning of groups which serve as "a face saving mechanism and an administrative category through which employees are allowed to evade some of the pressures of the social controls that surround them."

Thus, self-referral is a crucial element to be examined in the role of the supervisor for two reasons: (1) it has become widely accepted, and (2) it has been subject to little research. By directly or indirectly promoting the self-referral, work cultures and EAPs pass an organizational and cultural message of a diminished supervisory role. On the other hand, if the self-referral is a false and misleading concept, it will be even more important to reposition and reinforce the constructive confrontation strategy.

Drug Testing

Drug testing is a second issue directly affecting EAP referrals and the supervisor role. The last several years have given rise to an expanding war on illicit drugs which has spilled into the workplace in the form of drug screening and testing. While much attention has focused on effectiveness, legality, and acceptance, little attention has focused on drug testing strategies in light of EAPs. Although ideology and goals have generated numerous conflicts, this discussion will focus on the role of the supervisor.

To develop an approach for supervisors, the EAP had to overcome early problems. Over the preceding decade, supervisor involvement often exceeded the supervisor's competence and appropriate role behavior. Early occupational alcoholism programs had trained supervisors to observe the early signs of alcoholism, such as bleary eyes and alcohol on the breath. Supervisors, therefore, mistakenly began to diagnose alcoholism instead of relying on the more appropriate job performance deterioration. Unions strongly objected to this approach, fearing witch hunts, other misdiagnoses, and labeling. Consequently, the EAP movement developed policy, procedures, and training to reflect more appropriate identification and confrontation based on job performance measures.

Drug testing, however, partially reawakened this flawed approach of focusing on the drug. It highlighted testing—urine analysis—thus, separating strategy from job performance. Supervisors became part of a system that tested employees without any linkage to the employee's job performance. Even the training accompanying drug testing taught supervisors only the effects of drugs, the more technical aspects of drug testing, and their role in preserving the chain of custody. The job performance model so carefully crafted through the experience of the EAP was now contradicted. The new approach required supervisors to become more involved with drug abuse problems and less with monitoring and evaluating job performance.

The emerging drug testing strategy also created confusion for supervisors. Often, the same organization had two separate and distinct programs for alcoholism and drug abuse. Supervisors now had to distinguish between the two. For one drug there was an EAP, for the others a drug testing program. The EAP as a rehabilitation component was generally overshadowed by the attention given to testing. After years ofeducation about the false dichotomy between alcohol and drugs, the program now focused on drugs other than alcohol. It discounted alcohol as if it were not a drug. Adding to the confusion, supervisors now faced competing strategies for the same problem. The EAP had taught supervisors to place the drug problem within a job performance framework. Drug testing, by contrast, suggested an approach that used chemical testing, rather than job performance, to determine use. These parallel programs may well provide more confusion than clarity. They may be an obstacle to any integrated program. In addition, drug testing programs may generate distrust between employees andemployers. The controversy may spill over into the supervisor utilization of the EAP. So far, however, the experience is too recent to provide reliable answers to these questions.

FUTURE DIRECTIONS

The issues above may challenge the traditional supervisor role within the EAP. The supervisor role, as originally conceptualized within the EAP framework, may be diminished if: (1) self-referral predominates, and (2) the EAP continues to downplay supervisor training, while relying more on drug testing as a primary identification of employees with substance abuse problems. Despite these developments, there is insufficient evidence to warrant burial of the supervisor. Certainly, the conventional wisdom within the EAP field continues to embrace the role of the supervisor. Perhaps both the practice and research communities may better reexamine the role of the supervisor within a broadened framework. Constructive confrontation alone may be inadequate to deal with the complexity of the workplace and the dynamics of substance abuse within this context. The role of the supervisor might best be seen in the context of organizational integration and its evolution into a broadened conceptualization.

Integration of EAPs

The RAP exists and operates within work organizations. Consequently, its effectiveness is tied directly to its being perceived as an integral and important part of the organization. On the informal level, employees who have positive experiences in using the program help solidify its image. However, it is the interface and use by supervisordmanagers that integrate the program into the organization. The program's most important ally is the supervisor who has a positive experience in referring an employee. Its staunchest supporter is the supervisor who sees the EAP as an essential aid to overall management strategy. If supervisors are ignorant of the EAP or are not sufficiently convinced of its ability to help them achieve business goals, then the EAP will probably remain on the organization's periphery. While it may provide help for individuals who reach out for it, it will not be integrated into the organization's mainstream.

Viewing the supervisor as a mere potential source of referral misses the context within which supervisors and EAPs co-exist. Roman (1988) has recently reiterated that an EAP cannot remain a program—it must become its own unit or department to achieve integration into the organization. This development does not occur by rational planning process, but through political processes. Valued members of the organization (supervisors) must be educated about the EAP's importance to its human resource mission and strategy. This recognition may come from observation, program use, and training. Training produces supervisors who are knowledgeable and ready to use the EAP; it also gains their support, thus maximizing the influence and importance of the EAP within the organization. Without this conscious agenda and the presence of supervisor training, few opportunities may arise to constructively co-opt the management system in integrating the EAP into the organization.

Broadened Concept of Supervisor Role

The continuing evolution of the EAP as a unique work-based intervention requires a broadened concept of supervisor participation. A number of potentially negative factors, such as (1) the rise of the self-referral, (2) the increase in caseloads of emotional, family, and marital problems, and (3) the introduction of drug testing programs, may appear to work against the basic strategies upon which the EAP was based. However, the EAP may be evolving within a context where a range of strategies and interventions may be appropriate for certain organizations, or for certain subcultures or work groups within the organization.

The organizing principle for the EAP is not just the problem (drug) or the role (supervisor)—it is the work organization as a social system. Within that organization are multilevel drug and alcohol problems. For employees in late stages of denial, the constructive confrontation model maybe the only effective intervention. Other employees, after confrontations by their spouses, are ready to appear at the EAP if an outreach program is designed for them.

Alcohol and drug abuse may often be discovered only through the employee's self-referral to the EAP. The alcoholic and drug abuser often appear in community-based agencies not for treatment of the drug problem, but for help in marital, legal, or emotional problems. If the intake counselor can skillfully conduct an adequate drug history and assessment, then denial of the drug problem can be dealt with, and the real problem can be identified and treated. Thus, EAPs need not fear self-referrals, since they can be useful in getting to the more difficult drug problems which are mired in denial.

Self-referral versus supervisor referral through constructive confrontation may be a false dichotomy. More likely, employee problems exist along a continuum. The emergence of a particular problem will probably be determined by factors such as the nature and severity of the problem, the cultural norms within the organization, or the readiness and awareness of the supervisors to constructively intervene. In other companies, several work groups may operate in close systems of interdependence—in such cases, peer referral may be the best model. Occupations and organizations have unique cultural and structural properties which must be respected and incorporated into EAP strategies. Similarly, the EAP's particular evolution within the organization also must be incorporated into the strategy. In one company, for example, where the EAP has just been announced, it will need to build trust and awareness-thus its ability to offer a broad set of interventions and approaches is limited. In another company, however, where the EAP has matured over a decade, a more sophisticated need targeting may be possible for different sectors of the company. Recognizing the particular nature of the organization and the evolution of its EAP enables the role of the supervisor to be put within a broader context.

Finally, the role of the supervisor might well be placed within a context of social networks, While work organizations are widely accepted as social systems, EAPs have rarely utilized them to design and operate programs. The interventions, such as education and supervisor training, have generally focused on the individual. They generally have not recognized the social relationships and interactions cutting across the workplace. Problems with drugs and alcohol are not simply individuals' problems-they affect the total system. Thus, problem identification is not just the individual supervisor's responsibility—the natural work group must identify, confront, and refer to treatment employees with drug and alcohol difficulties. This method has been previously suggested for supervisor training (Googins and Kurtz, 1982) and was well recognized in Sonnensthul's exploration of self-referrals (1982). However, forcing an arbitrary strategy on all workplaces may not only be ineffective and inappropriate, but ignores the basic dynamics of the social system in the workplace.

Organizing the EAP within the framework of a social network is a more comprehensive and realistic approach to drug and alcohol problems. It incorporates many interventions or program types without touting one over the other. Not unlike treatment modalities, self-referral versus supervisor referral is not a question of preference but of appropriateness for a particular person in a particular work setting. Supervisors should be knowledgeable and ready to confront employees whose job performance is impaired. But union members, too, should be ready to refer their fellow members within a peer context. Individual employees, exercising their insight and other forms of informal coercion, should also be able to refer themselves. All these measures can take place within the same

EAP and under the same EAP umbrella. If the EAP takes advantage of the natural work and social systems already in place, it may broaden the role of the supervisor and incorporate it more effectively.

CONCLUSIONS

The role of the supervisor today is considerably more complex than in earlier occupational alcoholism days. Within the quickly changing environments of the corporation and the EAP, the role of the supervisor in EAPs has shifted, and continues to shift. However, despite these changes, the importance of the supervisor's role has not diminished. If anything, it has become more important. To carry out its mission, the EAP will require an even closer working relationship with supervisors. This relationship will not focus exclusively on the referrals to EAP services. The supervisor will also assist the EAP become more integrated into the corporation. The supervisor's broader range of services will reflect not just constructive confrontation, but more preventative strategies that rely on informal supervisor referrals and self-referrals. Moreover, these self-referrals may well originate from other employees and people outside the workplace.

Despite the conceptual centrality of the supervisor, additional research is needed to better understand the supervisor's role within the EAP and the particular dynamics of that role. Many questions await. What factors encourage and discourage supervisor participation within the EAP? How do drug testing programs affect participation? How effective is supervisor training on referrals? To what extent are self-referrals a product of informal supervisor activities? To what extent are self- or supervisor referrals affected by organizational variables and organizational culture? Which factors account for successful organizational integration of the EAP? By focusing on such research, the EAP field can better understand and utilize the resource of the supervisor's role within the structure and the supervisor can more effectively assist the EAP in realizing its mission and goals of identifying and rehabilitating employees with substance abuse problems.

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State Legislation: Effects on Drug Programs in Industry

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INTRODUCTION

Recent opinion polls indicate that drug abuse is the number one concern of the American public.[1] Substance abuse not only harms the user, but has many spillover effects: drunk drivers make lethal weapons of motor vehicles; alcoholics cause untold misery in their homes; intravenous drug users contribute to the spread of AIDS; criminal activity and violence accompanies illicit drug use. The list goes on and on.

Employers are deeply concerned about the effects of substance abuse in the workplace. Absenteeism increases; work performance is poor; injuries on the job increase; health care costs rise; equipment is damaged through improper operation; and non-abusing workers and members of the public are injured. Employers are, therefore, increasingly recognizing and fulfilling a responsibility to try to ensure a drug-free workplace.

In response to these health, safety and productivity concerns, employers have begun to set up comprehensive drug abuse prevention programs which have, as one component, some form of employee drug testing. Almost all major corporations now have formal substance abuse policies and, by 1987, nearly half of the Fortune 500 companies conducted some form of drug testing of their employees or applicants.[2]

But drug testing in the workplace has given rise to other concerns that conflict with the public's and the government's "get tough on drugs" and "user accountability" attitudes. Employees fear losing their jobs due to an incorrect test result. They fear damage to their reputation and the embarrassment of being tested for drugs. There is a sense of personal privacy relating to activities done outside the workplace: What I do on my own time is nobody's business but my own." Civil liberties organizations are concerned over invasions of privacy and possible violations of the Constitution. Some unions fear harassment of their members.

Although it is recognized that drug testing does deter substance abuse,[3] there is also an awareness of the legitimate concerns of employees. The dramatic increase in workers' use of drugs such as cocaine and the large number of companies conducting testing have spurred state legislators to introduce bills and enact laws aimed at regulating, and at times prohibiting, some forms of drug testing in the workplace. These State laws cover not only government employees, but private sector workers as well. How have these States chosen to deal with the concerns over widespread drug abuse and the use of testing to reduce this problem?

BASIC PROVISIONS OF COMPREHENSIVE STATE DRUG TESTING LEGISLATION

As of September 1988, eight States had enacted comprehensive drug testing laws.[4] A number of these statutes were patterned after a model bill drafted by the American Civil Liberties Union. The governors in at least two States, Wisconsin and Maine, have vetoed legislation which would restrict drug testing because they were concerned that these laws would impede efforts to reduce drug abuse.[5] The comprehensive State drug testing laws have 12 basic provisions (Table 1).

1. "For Cause" Testing

With the exception of Louisiana[6] and Utah, all States require that the employer have either "probable cause" or a "reasonable suspicion" to test an employee for the presence of drugs. Iowa not only requires that the employer have "probable cause to believe that an employee's faculties are impaired on the job," but also that the employee be "in a position where such impairment presents a danger to the safety of the employee, another employee, a member of the public, or the property of the employer."[7] Vermont requires "probable cause to believe the employee is using or is under the influence of a drug on the job."[8]

Minnesota requires that the employers have a "reasonable suspicion" for drug testing, and defines it as "a basis for forming a belief based on specific facts and rational inferences drawn from those facts"[9] Rhode Island uses the term "reasonable grounds" which must be based on specific objective data and must lead to the belief that "the employee's use of controlled substances is impairing his ability to perform his job."[10]

Table 1. Comprehensive State Drug Testing Laws

	Conn.	Iowa	La.	Minn.	Mont.	R.I.	Utah	Vt.
Requires probable cause or reasonable suspicion	x	x		x	x	x		x
Regulates preemployment testing	x	x		x	x			x
Prohibits random testing		x			x	x		x
Requires confirmatory test	x	x	x	x	x	x	x	x
Requires state-certified laboratories		x	x	x				x
Requires chain of custody procedures			x	x	x		x	x
Requires confidentiality of test results	x	x	x	x	x		x	x
Requres pricacy in testing process	x		x	x	x	x	x	
Requires employee assistance programs		x		x		x		x
Requires notice to employees		x	x	x	x		x	x
Provides civil remedies	x	x		x		x		x
Criminal penalties		x			x	x		x

The statutes provide no guidance on the nature and quantity of the "objective" and "specific" facts that will constitute sufficient probable cause or reasonable grounds for testing. Stats courts or regulatory agencies will have to provide more guidance on the meaning of these terms.

A "Model Drug Testing in Employment Statute" considered by an American Bar Association Committee," lists the following as examples when an employer may have a reasonable suspicion to conduct a test:

- Direct observation of drug use and/or the physical symptoms or manifestations of being under the influence of a drug

- Abnormal conduct or erratic behavior while at work

- Absenteeism, tardiness or deterioration in work performance

- A report of drug use provided by reliable and credible sources which has been independently corroborated

- Evidence that an individual has tampered with a drug test

- Information that an employee has caused or contributed to an accident while at work

- Evidence that an employee is involved in the use, possession, sale, solicitation or transfer of drugs while working or while on the employer's premises or operating the employer's vehicle, machinery or equipment.

Some State legislation does not require the existence of probable cause or reasonable suspicion if the drug testing is part of a regularly scheduled physical.[12] However, the employee must receive advance notice that drug testing will be part of the physical.[13]

2. Preemployment Testing

Five State laws also restrict preemployment testing.[14] Obviously, there cannot be a probable cause or reasonable suspicion requirement for applicants for employment since the prospective employer has not had the opportunity to observe the applicant. Those State legislatures that have regulated preemployment drug testing have fashioned other types of employer constraints.

Minnesota provides that the employer may require a job applicant to undergo drug testing if "a job offer has been made to the applicant and the same test is . . . required of all job applicants conditionally offered employment for that position."[15] Vermont requires that the applicant 'has been given an offer of employment conditioned on the applicant receiving a negative test result" and that the applicant be given a written notice 10 days before the test.[16] Vermont requires also that the test be given as part of a comprehensive physical examination.[17] Iowa requires that the employer inform applicants that a drug test will be part of a preemployment physical by including a notice in any advertisement soliciting applicants or in the application for employment.[18] In addition, the employer must personally inform the applicant of the drug test requirement at the first interview.[19]

3. Random Testing

A minority of the States that require the existence of probable cause or reasonable suspicion permit random drug testing under certain circumstances. Minnesota permits random testing for employees in "safety-sensitive" positions[20] and defines these as those "in which an impairment caused by drugs or alcohol usage would threaten the health or safety of any person."[21] Connecticut permits random testing if the employee is in a high-risk or safety-sensitive job as determined by regulations adopted by the State's Commissioner of Labor.[22] Connecticut and Minnesota also permit random testing if Federal law authorizes it.[23] Iowa and Vermont permit random testing only when Federal law authorizes it.[24] Louisiana and Utah impose no restrictions on random testing.

Legislators appear to have inserted these "safety-sensitive" and Federal law exceptions to the random testingprohibition in response to concerns over the effect that drug abuse by workers in the transportation sector could have on public safety. The 1987 Conrail tragedy in which 16 people were killed in a train wreck caused by a drug-impaired engineer clearly contributed to these concerns. Many State legislators recognize that employers should have more freedom to test when the use of drugs carries a high risk of injury to the public at large.

4. Confirmatory Tests

All State drug testing laws require that laboratories confirm test results before a company may discharge or otherwise discipline an employee for testing positive for the presence of drugs. Iowa requires one confirmatory test using an alternative method of analysis and, "when possible," the second test should use the same test sample used for the first test.[25] Connecticut and Montana require two confirmatory tests.[26] Minnesota requires one confirmatory test and provides that the employee or applicant may request a second confirmatory test at his or her expense.[27] Connecticut, Iowa, Minnesota, Montana and vermont extend the confirmatory test requirement to preemployment testing.[28]

5. State-Certified Laboratories

Four States require that laboratories licensed or otherwise regulated by the State conduct the tests.[29] The Minnesota and Vermont statutes contain provisions authorizing the State Department of Health to license laboratories that perform employee drug tests.[30] There is pending Federal legislation to license and regulate clinical laboratories. If enacted, this law will preempt State regulations in this area that are less stringent than the Federal regulations implementing the law.[31]

6. Chain-of-Custody

Five of the eight States require the employer to follow reliable chain of custody procedures to ensure proper recordkeeping, handling, labeling and identification of the samples.[32] Minnesota has chosen to set forth the chain of custody procedures by regulation.[33]

7. Confidentiality of Test Results

Seven of the eight States require that the employer keep the test results confidential. Iowa provides that the employer may record the test results in the employee's personnel record but they must be kept in confidence.[34] In addition, once the employee leaves employment, the Iowa employer must expunge from the personnel record any reference to the test or its results if the employee successfully completed a treatment program for substance abuse.[35] Minnesota allows the use of evidence of a positive test result in an arbitration proceeding pursuant to a collective bargaining agreement or in a judicial proceeding and the result may be disclosed when Federal law requires it.[36]

Vermont prohibits any type of disclosure except when a court compels it in connection with an action brought under the drug testing statute.[37] The Vermont law also provides that the evidence will not be admissible in any judicial or quasi-judicial proceeding unless the proceeding is brought under the drug testing statute.[38]

Five of the eight States prohibit the use of evidence of a positive result in a criminal proceeding against the employee.[39]

8. Privacy in Testing Process

Six of the eight States address the question ofprivacy when the employee provides the testing sample. The Rhode Island statute indicates that the employee may provide the test sample "in private, outside the presence of any person."[40] Utah requires that samples be collected "with due regard to the privacy of the individual."[41] Connecticut provides that no one can directly observe an employee in the process of producing a urine specimen.[42] The Minnesota statute directs the Department of Health to promulgate regulations governing procedures for taking a sample "that ensure privacy to employees and job applicants to the extent practicable, consistent with preventing tampering with the sample."[43]

Although the majority of States recognize the importance of employee privacy in the sample collection process, they also recognize that the employer may implement reasonable and non-intrusive procedures to prevent tampering with the sample.

9. Employee Assistance Programs

Four States require that employers establish employee assistance programs for the treatment and rehabilitation of employees who test positive. Iowa requires the employer to provide substance abuse evaluation and treatment (if recommended after evaluation) at the employer's expense.[44] The employer cannot take disciplinary action the first time the employee tests positive if the employee undergoes a substance abuse evaluation and successfully completes the recommended treatment.[45] Minnesota also prohibits discharge before giving the employee an opportunity to participate in a counseling or rehabilitation program, at the employer's expense.[46] Vermont provides that the employee may be suspended for the period of time necessary to complete the program, but in no event longer than 3 months.[47]

10. Notice to Employees/Opportunity to Explain Test Results

Five States require employers to provide employees a written statement on the employer's substance abuse policy and drug testing program.[48] When the drug testing is done as part of a regularly scheduled physical examination, Iowa requires that the employer give the employee at least 30 days notice that a drug test will be part of the physical.[49] Minnesota requires 2 weeks written notice.[50] In addition, five States also require employers to give to the tested employee an opportunity to rebut or explain positive test results[51]

11. Civil Remedies

Five State laws provide civil remedies for the employee if the employer fails to comply with statutory requirements. Connecticut provides that "any aggrieved person" may enforce the statute and recover special and general damages, attorney's fees and costs.[52] Iowa grants a cause of action for "affirmative relief including reinstatement or hiring, with or without back pay, or any other equitable relief . . . including attorney fees and court costs."[53]

The Minnesota statute creates a cause of action "for any damages allowable at law."[54] The employee may recover attorney's fees if the employer's violation was knowing and reckless.[55] Minnesota also authorizes the court to grant "any other equitable relief it considers appropriate," including reinstatement with back pay.[56] Rhode Island provides for punitive damages, actual damages, attorney's fees and costs.[57] Vermont also provides for damages, court costs and attorney's fees, in addition to a civil penalty of not more than $2,000.[58]

Louisiana and Utah have chosen to narrow any civil remedies that may be available to the employee. Louisiana does not create a cause of action for damages. It does, however, recognize that a cause of action for defamation may arise but it is limited to unauthorized disclosures based on a false test result.[59] Utah requires that any cause of action for damages be based on a false test result, but provides that the employer is not liable if his or her reliance on the false test result was reasonable and in good faith.[60] Utah also creates a rebuttable presumption that the test result was valid if the employer complied with the statute.[61]

12. Criminal Penalties

Four of the eight States make it a misdemeanor to violate the statute, punishable by imprisonment, a fine, or both.[62]

General Comments on Statutory Provisions

The basic provisions of the State drug testing laws contain two underlying principles of constitutional dimensions. Although the U.S. Constitution does not regulate the conduct of private parties, these statutes extend the constitutional constraints imposed on government employers to private employers as well.

The first principle is the protection of the employee's privacy, that is, the fourth amendment right to be free from an "unreasonable" search. It is reflected in such provisions as the requirement of probable cause or reasonable suspicion before testing and the provision that only employees in safety-sensitive positions be subject to random testing.

The Constitution does not prohibit all searches, but only those that are "unreasonable." Drug testing in the workplace can be reasonable when conducted pursuant to appropriate policies and procedures. Indeed, a majority of government drug testing programs have withstood challenges that they violate the fourth amendment.[63] On March 21, 1989, the U.S. Supreme Court held that an employer in the safety-sensitive railroad industry need not have individualized suspicion to conduct post-accident drug testing.[64] The Court also upheld the constitutionality of a drug testing program for customs employees seeking transfer to a position involving interdiction of illegal drugs or requiring them to carry firearms.[65]

The second principle embodied in the drug testing laws is fairness to the employee. This is akin to the constitutional due process requirement. It is reflected in such provisions as certification of testing laboratories, chain of custody requirements, confirmatory tests and opportunity to explain test results.

Due process arguments made against government drug testing programs generally claim that the tests are inaccurate; that the results are insufficiently related to work performance; or that the employee was punished without being afforded an opportunity to contest test results. A large majority of government drug testing programs have also survived due process challenges.[66] Indeed, there appears to be no question legally that courts will accept the accuracy and reliability of test results when employers use appropriate procedures.

CONCLUSIONS

As Table 1 indicates, five of the eight States which have enacted drug testing laws have adopted more than half of the basic provisions intended to protect employees, with four States adopting almost all of them. The majority of the statutes are, therefore, focusing more on employee rights than on the drug abuse problem. Some States have imposed formidable barriers to drug testing, including the prohibition of random testing for almost all job classifications and the limitation of even "for cause" testing to only those in safety-sensitive positions. These laws have affected some employers' use of drug testing as one element of a comprehensive substance abuse prevention program.

Statistics show clearly that properly instituted comprehensive substance abuse prevention programs which couple drug testing with high laboratory standards, education and training programs for workers and supervisors, and treatment and rehabilitation services for those workers who need them, do reduce drug abuse and improve health, safety and productivity. On the other hand, it is equally clear that companies should not be permitted to cut comers in setting up programs which could affect employees' reputations and livelihoods.

No State has prohibited drug testing in the workplace. This is a recognition that, in certain instances, employers, employees and the public can benefit from this method of deterring drug abuse. There needs to be a balance between the need to reduce drug abuse with the need to protect against unreasonable actions on the part of employers. Legislators should, therefore, considerhowbest to ensure that appropriate drug testing is not unnecessarily curtailed while encouraging employers to set up comprehensive substance abuse prevention programs aimed at providing a healthier, safer, and more productive workplace for all employees.

ENDNOTES

[1] ABC News Poll, September 1988.

[2]Watson, "Drug Testing Laws Are Catching On," *Governing* 61 (June 1988).

[3] For example, in 1981 the U.S. Navy found that 48% of its enlisted men under 25 were using drugs illegally. After implementing a comprehensive substance abuse program which included random drug testing, drug use fell to about 3%. *See* "Urine Testing for Drugs of Abuse," NIDA Research Monograph Series No. 73, Hawks, R.L. and Chiang, C.N. (eds.) (1986).

[4]Connecticut, Iowa, Louisiana, Minnesota, Montana, Rhode Island, Utah and Vermont have enacted comprehensive laws which include provisions relating not only to testing standards but also to factors such as confidentiality, privacy and employee assistance programs. Oregon amended its Public Health and Safety laws to require that all drug testing be done in licensed laboratories and that a confirmatory test be conducted in a licensed laboratory when the test results are to be used to deprive a person of employment or benefits. Ore. S.B. 478, L.1987. In 1988, Maryland and Nebraska enacted laws similar to the Oregon law. Maryland H.B. 1186 (signed into law on May 27,1988); Nebraska L.B. 582 (signed into law on January 29,1988).

[5] Watson, "Drug Testing Laws Are Catching On," Governing 61 (June 1988).

[6] The Louisiana drug testing provisions are part of that State's workers' compensation statute and affect only employers who have fired an employee and are forced to defend their action when the employee files an unemployment compensation claim.

[7] Iowa Code sec. 730.5(3)(a) and (b). An alternative to the latter requirement is if the impairment is "due to the effects of a controlled substance in violation of a known rule of the employer." Iowa Code sec. 730.5(3)(b).

[8] Vt. Stat. Ann., Tit. 21, sec. 513(c)(1).

[9] Minn. Stat. sec. 181.950(12).

[10] R.I. Gen. Laws sec. 28-6.5-1(A).

[11] The Alcoholism and Drug Law Reform Committee. Neither the ABA Individual Rights and Responsibilities Section nor the American Bar Association has endorsed this model drug testing statute.

[12] See, e.g., Iowa Code sec. 730.5(7); Minn. Stat. sec. 181.951(3).

[13] *Id.*

[14] Conn. Gen. Stat. Ann. P.A. 87-551 sec. 3 (West 1988 App.); Iowa Code sec. 730.5(7); Minn. Stat. sec. 181.951(3); Mont. Code Ann. sec. 39-2-304(l)(b); Vt. Stat. Ann., Tit. 21, sec. 512.

[15] Minn. Stat. sec. 181.951(2).

[16] Vt. Stat. Ann., Tit. 21, sec. 512(b)(1) and (2).

[17] Vt. Stat. Ann., Tit. 21, sec. 512(b)(3).

[18] Iowa Code sec. 730.5(7)(a).

[19] *Id.*

[20] Minn. Stat. sec. 181.951(4).

[21] Minn. Stat. sec. 181.950(13).

[22] Conn. Gen. Stat. Ann. P.A. 87-551 sec. 7(2) (West 1988 App.).

[23] Conn. Gen. Stat. PA. 87-551 sec. 7(1) (West 1988 App.); Minn. Stat. sec. 181.957(1).

[24] Iowa Code sec. 730.5(2); Vt. Stat. Ann., Tit. 21, sec. 513(b).

[25] Iowa Code sec. 730.5(3)(d).

[26] Conn. Gen. Stat. Ann. P.A. 87-551 sec. 2(2) and (3) (West 1988 Supp.); Mont. Code Ann. sec. 39-2-304(2)(e).

[27] Minn. Stat. sec. 181.953(3) and (9).

[28] Conn. Gen. Stat. Ann. P.A. 87-551 sec. 3(2) (West 1988 App.); Iowa Code sec. 730.5(7); Minn. Stat. sec. 181.953(3); Mont. Code Ann. sec. 39-2-304(2)(e); Vt. Stat. Ann., Tit. 21, sec. 514(6)(A).

[29] Iowa Code sec. 730.5(3)(c); La. Rev. Stat. Ann. sec. 23:1601(10)(b); Minn. Stat. sec. 181.953(1)(a); Vt. Stat. Ann., Tit. 21, sec. 514(4).

[30] Minn. Stat. sec. 181.953(1)(b)(1); Vt. Stat. Ann., Tit. 21, sec. 518.

[31] H.R. 5471, 100th Cong., 2d Sees. sec. 2(p) (1988) ("Clinical Laboratory Improvement Amendments of 1988").

[32] La. Rev. Stat. sec. 23:1601(10)(c)(iv); Minn. Stat. sec. 181.953(5); Mont. Code Ann. sec. 39-2-304(2)(d); Utah Code Ann. sec. 34-38-6(4); Vt. Stat. Ann., Tit. 21, sec. 514(5).

[33] Minn. Stat. sec. 181.953(1)(b)(6).

[34] Iowa Code sec. 730.5(8).

[35] *Id.*

[36] Minn. Stat. sec. 181.954(3).

[37] Vt. Stat. Ann., Tit. 21, sec. 516(b).

[38] Vt. Stat. Ann., Tit. 21, sec. 516(c).

[39] Conn. Gen. Stat. Ann. P.A. 87-551 sec. 5 (West 1988 App.); La. Rev. Stat. sec. 23:1601(10)(e); Minn. Stat. sec. 181.954(4); Utah Code Ann. sec. 34-38-13(1);Vt. Stat. Ann., Tit. 21, sec. 516(c).

[40] R.I. Gen. Laws sec. 28-6.5-1(B).

[41] Utah Code Ann. sec. 34-38-6(2).

[42] Conn. Gen. Stat. Ann. P.A. 87-551 sec. 4 (West 1988 App.).

[43] Minn. Stat. sec. 181.953(1)(b)(3).

[44] Iowa Code sec. 730.5(3)(f).

[45] *Id.*

[46] Minn. Stat. sec. 181.953(10)(b)(1).

[47] Vt. stat. Ann., Tit. 21, sec. 513(c)(3).

[48] La. Rev. Stat. sec. 23:1601(10)(a); Minn. Stat. sec. 181.952(2); Mont. Code Ann. sec. 39-2-304(2); Utah Code Ann. sec. 34-38-7; Vt. Stat. Ann., Tit. 21, sec. 514(2).

[49] Iowa Code sec. 730.5(7)(b).

[5o] Minn. Stat. sec. 181.951(3).

[51] Iowa Code sec. 730.5(3)(e); Minn. Stat. sec. 181.952(1)(5); Mont. Code Ann. sec. 39-2-304(3); R.I. Gen. Laws sec. 28- 6.5-1(F); Vt. Stat. Ann., Tit. 21, sec. 515(a).

[52] Conn. Gen. Stat. Ann. P.A. 87-551 sec. 11(a) (West 1988 App.).

[53] Iowa Code sec. 730.5(9)(a).

[54] Minn. Stat. sec. 181.956(2).

[55] *Id.*

[56] Minn. Stat. sec. 181.956(4).

[57] R.I. Gen. Laws sec. 28-6.5-1.

[58] Vt. Stat. Ann., Tit. 21, sec. 519(a) and (c).

[59] La. Rev. Stat. Ann. sec. 23:1601(10)(f).

[60] Utah Code Ann. sec. 34-38-10(1) and (2)(b).

[61] Utah Code Ann. sec. 34-38-10(2)(a).

[62] Iowa Code sec. 730.5(11); Mont. Code Ann. sec. 39-2-304(5); R.I. Gen. Laws sec. 28-6.5-1; Vt. Stat. Ann., Tit. 21, sec. 519(d).

[63] *See Policeman's Benevolent Ass'n of New Jersey v. Township of Washington,* 850 F.2d 133 (3d Cir. 1988) (random testing of police does not violate fourth amendment); *Rushton v. Nebmska Public Power District,* 844 F.2d 562 (8th Cir. 1988) (random testing of personnel in state-owned nuclear plant is constitutional); *Jones v. McKenzie,* 833 F.2d 335 (D.C. Cir. 1987), *pet. for cert. filed,* Apr. 15,1988 (No. 87-1706) (where there is a clear nexus between drug testing and legitimate safety concern, employer may test employees whose duties require direct contact with school children as part of routine, annual physical); *Shoemaker v. Handel,* 795 F.2d 1136 (3d Cir.), *cert. denied,* 107 S.Ct. 977 (1986) (state racing commission's random testing of jockeys does not violate fourth amendment). *But see, Luvvorn v. City of Chattanooga,* 846 F.2d 1539 (6th Cir. 1988), panel decision vacated and rehearing en banc ordered (6th Cir. Aug. 3,1988) (universal testing of city fire fighters violates fourth amendment).

[64] *Skinner* v. *Railway Labor Executives Ass'n,* 109 S. Ct. 1402 (1989).

[65] *Nat'l Treasury Employees v. von Raab,* 109 S. Ct. 1384 (1989).

[66] *See Copeland v. Philadelphia Police Dept.,* 840 F.2d 1139 (3d Cir. 1988) *pet. for* cert. *filed,* July 2,1988 (No. 88-26) (no violation of due process where officer was aware of reason for test, was advised that he had tested positive, and was afforded notice and hearing on charge of illegal drug use before written charges were prepared); *Everett* v. *Napper,* 833 F.2d 1507 (11th Cir. 1987) (no due process violation where firefighter received adequate notice and full hearing prior to termination for failure to submit to reasonable suspicion urinalysis); *Nat'l Treasury Employees Union v. Von Raab,* 816 F.2d 170 (5th Cir. 1987), aff'd on other grounds, 109 S. Ct. 1384 (1989)(drug testing program for Customs employees seeking transfer to sensitive positions not so unreliable as to violate due process where follow-up test almost always accurate, Customs used proper chain of custody procedures, and employee entitled to resubmit specimen to laboratory of his own choosing for retesting). *But see, Banks v. FAA,* 687 F.2d 92 (5th Cir. 1982) (disciplinary action overturned for failure to preserve urine sample).

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Building a Cumulative Knowledge Base About Drugs and the Workplace

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INTRODUCTION

The largest drug problem for U.S. workers and employers is the widespread overuse of two licit drugs: alcohol and tobacco (Harwood et al., 1984; Rice, 1986). These are familiar, quotidian evils, well-known to all generations presently living in the country. The law hedges them in but is committed to coexistence, though the boundaries of acceptable use vary with time. Another truce-policed by health professionals and drug enforcement bureaus-exists with respect to prescription psychoactive medications, which have medically accepted purposes but are also widely abused (e.g., tranquilizers, sedatives, antidepressants, and analgesics).

Marijuana, heroin, and cocaine are a different matter; these drugs are emphatically proscribed. Because more urgent attention is now being focused on these and other illegal drugs, they are the main concern of this discussion. However, much that is said about illicit drugs is also applicable when discussing alcohol, psychoactive medicines, and (to a lesser extent) tobacco (Levison et al., 1983).

THE NATURE OF THE PROBLEM

The evidence on how widespread drugs are in the workplace, what the consequences of drug use are, and what measures are effective in preventing or reducing either drug use or its consequent problems, is fragmentary (Backer, 1987). The research is impressive on some points and virtually nonexistent on others. It is threatened by obsolescence due to the continually changing nature of drug markets, the work force, and the workplace. Appropriate responses should be based on a consensus about objectives and on a coherent and continuously improving body of theory and data. Our knowledge base should cover the extent of the problem, its individual and local impacts, and its overall systemic effects on the workplace and on society. Recognizing all the above, dealing with the multitude of relevant variables is a strenuous challenge to clear thinking and rigorous investigation.

Time and place are two confounding variables. When and where drugs are taken and manifest their effects-in what behavior patterns, in what industry or occupation, on the job or off the job-makes a big difference to an employer or other agent in deciding whether (and how) to intervene.

Short and Long Term Effects

Drugs have both short- and long-term effects that must be taken into account. A sudden inability to meet minimum job requirements may indicate the presence of drug-induced impairment, However, since drugs often work subtly and gain control of behavior gradually, the effect of drug consumption may be that a very promising performer stays on the job but never reaches his or her expected potential.

Workers can also be impaired by drugs without being obviously intoxicated. Often chronic users show significant secondary effects like depression, isolation, motor dysfunction, and family difficulties that seriously affect job performance. Such chronic effects are often not detected until a major incident occurs. These effects may be even more pronounced between episodes of intoxication than during them, and they may persist long after drug use has ended. Workers not directly under the influence of a substance may exhibit decreased performance because of work time spent worrying about or arranging to obtain drugs for off-site use. Individuals who enforce drug prohibitions, such as police, prosecutors, or supervisors, but who are themselves users off the job, may be motivationally impaired in their job performance.

The consequences of drugs depend not only on the generic effects of the specific drug but also on the individual user, (including behavioral tolerance and genetic factors) and on the relevant job requirements, level of supervision, and possibility to use alternative non-impairedbehaviors to do the work. Some drugs in some individuals may produce an increment, not a decrement in performance. For example, stimulants may improve vigilance or reduce sensitivity to discomfort in some circumstances. Other drugs, at appropriate doses, are likely to impair the ability to detect novel events or respond rapidly or effectively to them; but such dose levels may not degrade well- practiced routines at all. The frequency of changes in job requirements, as well as the seriousness of an error or delay in responding to these changes, are important determinants of how seriously drugs may effect a workplace setting.

Interaction Between Drug, Person, Job

It is difficult to quantify what drug levels are objectively significant in looking at their effects in the workplace. Adverse effects result not from one factor (the drug) alone, but from interaction between the drug, the person, and the job. A 10 percent impairment in performance might not be sanctioned *or* even noticed in a generally outstanding performer, or in a low demand occupation, but might be job-jeopardizing or life threatening for an individual in a high risk job (Landy, 1985).

The relation between drug use and workplace performance may also be a two-way street. While workers may resort to drugs because of problems outside the workplace, some kinds of workplace settings, and specific jobs in particular, may themselves contribute to increased drug use. For example, the prevalence of stimulant drug use among long-haul transportation operators is legendary. In this context, the work site might be looked at as a place to understand why people use drugs, and how job redesign might significantly affect this behavior. It is problematic whether specific subgroups of workers are more prone to drug use, or whether certain jobs are likely to have high drug use prevalence no matter what type of worker fills them (Cf. Parker and Farmer, 1988).

To understand the interplay of these variables and hence the ultimate impact of drugs on the workplace, one must be able to detect and measure drug use and drug effects in a workplace setting. This has proven to be a difficult and challenging task for technical, social, and legal reasons. If the proximate goal is to discover reliable connections between drug use and changes in job performance, then a multi-step discovery process must be completed, each step of which requires validation:

drug use other factors
⇓ ⇓
behavioral changes other factors
⇓ ⇓
performance impairment other factors
⇓ ⇓
negative effect on work

Even if it is reliably established that a given type of drug use results in a package of behavioral changes, it is still necessary to validate that such changes result in performance impairment, and that these impairments are not negated by other factors, but actually have a negative effect on work. When adverse job effects are evident, it is often necessary to investigate backwards to validate that such changes were engendered by drug use.

In sum, the problem of drugs and the workplace is very complicated. The phenomena are not unitary, and the scientific and practical concerns are far-ranging. Little progress can be made on the basis of individual research efforts unless they can be cumulated. A preliminary step toward organizing the knowledge base and developing research agendas to fill the gaps in our understanding is to break down the subject along two dimensions: 1) the specific practical concerns that bring govements, corporations, and the public to support research and intervention on these issues; and 2) the principal methods available to increase the knowledge base. These dimensions intersect to form a matrix of important research opportunities (Figure 1). Acquiring information to fill in this matrix will require an increased level of commitment from the research and business communities.

Figure 1. Sources of Knowledge About Drug Use and Consequences in the Workplace

Specific Concerns	Physical Testing	Self-report	Observation and Referral
Safety			
Productivity			
Health			

SPECIFIC CONCERNS

Three analytically distinct, though concretely interrelated, concerns drive the interest in drugs and the workplace: workplace safety, productivity, and health.

Safety

Real and imaginary images of train wrecks, botched surgeries, poisonous leaks, or explosions due to drug-impaired workers highlight the safety problem. The presumption is that drug use is strongly correlated with impairment and poses a risk not only to the individual employee but also to his or her coworkers and society at large. Concern is concentrated largely in high-risk or high-precision occupations prevalent in industries such as transportation, energy, and medical care.

Productivity

Images of loose fender bolts, badly considered investments, and slow moving, understaffed sales counters tell the productivity story. Lackadaisical attitudes, foggy thinking, and impaired physical abilities attributed to drug use may create a cumulative drag on company and household earnings. Drug influenced increases in absenteeism, sickness, and worker turnover affect both worker output and the overall quantity, quality, and salability of products. Drug induced mood changes affect worker interaction. A worker who thinks that coworkers are on drugs and hence less reliable may be unwilling, especially in high risk, coworker-dependent occupations such as law enforcement, firefighting, and the military, to take the risks inherent in doing a good job.

Health

Finally, the health of the work force, and, by extension, society at large, is also a driving concern. Increasing use of sick leave, skyrocketing costs of medical benefits and disability, and high early retirement due to drug-induced illnesses have a telling systemic effect on the workplace, and on the economics of health care in general. The cost of caring for drug-induced illness and disability should encourage evaluation by employers and employees even if the specific effects of drugs on job performance are unknown, From this perspective, the workplace may be conceived as a powerful lever to decrease drug use in the population generally, by encouraging or requiring healthy behavior on the job, and by encouraging the extension of these behaviors to the community. Workplace detection programs and intolerance of drug use, as well as rehabilitative attempts by employers, may have a measurable effect on those in the population for whom steady work is a priority.

DETECTION METHODS

Whatever the basis of concern about drugs, it is difficult to act on it unless drug use can be evaluated, measured, or observed. There is currently no universal method for detecting or documenting the effects of specific drugtakingbehavior on specific task capabilities. Quite different methods of assay have been developed and arebeingfurther refined, but these have varying suitabilities and limitations in illuminating the problem. The three principal methods currently in use are physical testing, self-report, and on-the-job observation and referral.

Testing

Urinalysis testing is currently the most widely used method for detecting individual drug users. It is currently used to deter, prevent, and control drug use in the workplace setting (General Accounting Office, 1988a). Routine pre-employment drug testing or "screening" is most common, accounting for an estimated 4 million such tests annually (versus about 1 million tests for current employees) (Bureau of Labor Statistics, 1989). Eliminating employment of those who test positive can substantially reduce employee applicant pools—in some sites by more than half. On average, about 12 percent of pre-employment tests are positive, versus about 9 percent of tests on current employees. The latter are of two kinds. "Random" tests of full-time employees are controversial. These kinds of testing programs generally detect drug metabolites in as few as <1 percent or as many as 30 percent of those tested. "Probable cause" or "incident driven" testing is carried out to confirm strongly suspected intoxication, and yields the most frequent positive results. But no epidemiological generalizations can be based on such non-routine testing(General Accounting Office, 1988b; Bureau of Labor Statistics, 1989; Lund et al., 1987).

Drug testing is seen as an important method of deterrence, as a way of gaining access to problem employees in order to offer rehabilitation programs, and as a research tool to study and understand the parameters of the problem. Although prevalence figures often decline in the wake of screening programs, it is not clear if this is due to a real change in drug-taking behavior or to successful methods of evasion. Testing is very difficult to evade when it is conducted at random and well-monitored by direct observation or by temperature measurement (Person and Ehrenkrantz, 1989).

The ability of a drug screen to demonstrate impairment is limited. A positive drug test does not predict or prove that there are or will be specific behavioral deficits that will affect job performance. Furthermore, the accuracy of field tests has been seriously questioned and may make companies vulnerable to legal challenges (Council on Scientific Affairs, 1987).

As a method of preventing drug use in the workplace, preemployment screening may discourage drug-using applicants from applying for jobs. From a treatment perspective, however, screening may simply engender agrowingpool of unemployed drug users who have no access to workplace-sponsored rehabilitation programs and who increase the already great pressure on public treatment programs. Data are needed on what happens to those excluded from work opportunities by preemployment screening.

In sum, although urine testing is widely used by employers, especially large ones, there is limited agreement as yet on the rationale for its use, its legal status, the appropriate responses to positive tests, or the epidemiological significance of these findings.

A different approach to testing for drug impairment is the performance test. The ideal test would be a brief, readily administered task or battery of tasks, which would evaluate performance efficiency quickly and accurately and tell an observer whether drug intoxication is present. An example is the recently standardized "Field sobriety test battery" used in traffic law enforcement, with which police officers can learn to detect the presence of moderate to high levels of alcohol or sedative drug intoxication (Bums, 1985). Unfortunately, no ready analog to these measures for low-level alcohol/sedative presence, other drug classes, or other skills is available.

Self-Report

Confidential self-report of drug use and its related effects by using surveys and interviews is a major research tool. When done properly, this method can be remarkably useful and accurate in discovering overall rates and patterns of drug use. However, since its effectiveness is largely predicated on anonymity, it cannot be used to deter individual drug use or to generate referral to treatment for users. Self-report surveys can also give some very suggestive indications about job impairment or health problems. However, these leads need to be expanded and supplemented by an extensive research program in order to validate and calibrate these items and their correlational significance to drug use. (A different, non-anonymous kind of self-report is derived from individuals who have recovered from drug dependence and as their personal responsibility seek to educate and motivate others to enter treatment for drug problems.)

Observation and Referral

A very promising but sporadically utilized method of detection is observation and referral by supervisors and peers (Backer, 1987). Daily interaction between people at work can be a powerful and abundant source of information about drug induced impairment. It allows the detection of subtle kinds of behavior differences that may not show up in aggregate accident or incident data. Such incremental, early degradations of day-to-day performance over time are often characteristic of sustained or intensifying drug use.

Awareness programs, aimed at sensitizing supervisors and workers to the presence of drugs, may provide a checklist of "standard indicators of difficulty" to help them recognize changes in behavior and job performance resulting from drug use. These could include task deficits as well as more subtle impediments such as hostility, social maladaptivity, absenteeism, and stress. Without being called on to be full-fledged diagnosticians, supervisors or coworkers observing such indicators would then have the knowledge necessary to confront a worker and refer him or her to an agency which, using appropriately trained personnel, can better explore the causes of the changed behavior and the relation, if any, to drug use.

Detection by observation and referral may provide: 1) an efficient means of early detection of drug use, and 2) a chance to prevent both future use and performance problems on the job. Maintaining adequate records may provide data which links specific behavioral changes and drug use by correlating actions of referred workers and independent documentation by the agency that the impaired worker has a drug problem. Correlations utilizing data collected in referrals can provide assessments of drug risks for specific workers and specific jobs.

The success of such an approach is based on several assumptions. Supervisors and peers must be willing to take responsibility for evaluating each others' performance, and must be motivated and unafraid to assume this detection role. Four issues need to be addressed here if intervention is to occur on a regular basis:

- What are the behaviors which signal impairment?
- What should be done if the marked behavior occurs?
- Whose responsibility is it to notice and to respond to the problem?
- What consequences might there be for the one who does notice and respond?

Supervisor and workers need the tools to detect behavior changes and they must be convinced of the need to use them. Several factors mediate against this. Being a taleteller is unacceptable in our culture. Although supervisors and coworkers certainly notice changes in worker behavior, they often do not want to consider drug use as a cause. Supervisors are often drawn from the ranks of the workers and realize their own vulnerability to the same problems. Poor performance evaluations may result in punitive measures against a worker whom the supervisor and other workers must confront on a daily basis. Appropriate referrals are more likely when there is a therapeutic, and not simply a punitive, component to the response.

ENHANCING THE RESEARCH BASE

The three main avenues of drug detection all provide for a better understanding of drug abuse in the workplace. Well-designed programs can provide both an early warning system for detecting drug abuse and the chance to plan and initiate prevention measures. Workers, under threat of physical drug testing or under informed scrutiny of supervisors and coworkers, may make safer, more healthful, and more productive decisions about drug use. Knowledge about specifics of drug use in a given type of job or cohort of workers may be very useful as risk indicators and as a tool for redesigning parts of the workplace that may contribute to these problems. Workplace research may help us understand why people use drugs and how the workplace might encourage or prevent that use.

We can conceive of the concerns and methods reviewed above as forming the intersecting rows and columns of a research grid, as in Figure 1. A systematic research program would explore the acceptability, costs, and utility of each of the three detection methods—actually, three constellations of methods—in addressing the respective concerns. The program would aim to assemble cumulative findings and use this intelligence to guide more research into those channels that prove most productive. Of course, the productivity ofdetection leads directly to the question of what interventions result from detection, and how effective those interventions are.

At present, there is not much data to fill in most of these cells. Data about the incidence and effects of drug abuse overall and in particular industries and companies is not yet available. Most responses to drug and workplace issues by industry are not based on sophisticated empirical analyses of the problem. Instead they arise from particular incidents that may dramatize the problem or from an ethical conviction or business judgment by a company or a union that something should be done.

Since, asnotedabove, methods of detection and correlations with specific performance decrements are still problematic, evaluating the systemic effects of workplace drug abuse may be best served by looking at the changes that occur in the workplace when drug use issues are addressed. Such outcome data dealing with overall productivity considerations and the health of the work force may be the most useful indicator on the near horizon about responses needed to control the problem.

Cost-Benefit Analyses

Careful cost-benefit analyses can have an important effect on business concerns. Companies are likely to act on data that reflect costs of untreated drug abuse among their workers. Management can be expected to ask whether it costs less to treat drug abuse than to accept or ignore it. If a company sees that a given intervention program will increase productivity or decrease personnel costs (e.g., less absenteeism, health problems, or turnover) by a predictable percentage, it is more likely to initiate that program. The technique of utility analysis may be used to calculate the dollar payoff of having a drug detection and rehabilitation program as opposed to firing an employee and training another. Such information would seem a powerful incentive toward taking appropriate actions.

How to best conduct such a cost-benefit analyses is still under debate. It is far from certain that the most reliable data will indeed support the contention that drug interventions reduce personnel costs. Even so, intervention programs may be desirable even if there is a net cost increase. Employees themselves may underwrite a large share of the costs of rehabilitation through their compensation packages, and altruistic or good will motives may bear heavily on corporate personnel decisions. Some researchers believe EAPs and related programs save substantial amounts of money in the near term, not only by raising productivity, but also by reducing absenteeism and health care claims, and avoiding replacement, recruitment and training costs. Other researchers believe these types of human resource improvement programs provide long-term payoffs and are not cost-saving for many companies due to intrinsically high employee turnover rates and high return-on-investment criteria.

Unfortunately, industry is currently not computerizing or compiling data on drug use and drug programs, or looking for useful correlations with specific jobs, workers, demographics, etc. Although initial EAP referrals may be recorded, many EAPs simply close their case records after a recovered worker has returned to the job. An encouraging change in this situation is shown by some current efforts to link EAP data to workers' compensation cases. This may yield information on what types of specific jobs and injuries may be drug-related as well as how large the problem is in a given company, and whether rehabilitation programs can ultimately reduce industry costs.

Licit drugs should be included in cost-benefit analyses. In 1985, there were about 12 million users of cocaine. However, there were *140* million users of alcohol (National Institute on Drug Abuse, 1987). Alcohol is the critical drug in terms of workplace absenteeism and undoubtedly accounts for the majority of intoxication and addiction-related problems in the labor force. Despite this knowledge, industry does not screen for alcohol or for prescription and over-the-counter drugs. Most users of illicit drugs also use licit drugs in excessive or inappropriate ways.

A possible way to circumvent some of the detailed cost-benefit issues may be to subsume drug programs under the umbrella of "positive health enhancement" in the workplace (Fielding and Piserchia, 1989). In this context, drug use is not isolated behavior, but rather falls under the category of disruptive, risk-taking behavior. This approach would obviate the need to determine how much drug use costs the organization in terms of dollars and organizational effectiveness, since the response is addressed to individuals with many kinds of problems that affect the workplace. This approach might be more attractive to employees and supervisors. One would still, however, have to document effective reasons for management to support general health enhancement as a reasonable expenditure and to accept future cost-effectiveness estimates of such programs.

CONCLUSIONS

It is essential that the flow of information between researchers and the workplace be improved and expanded. The number of appropriately trained researchers in industrial employment is small; most academic researchers have found it difficult to develop the necessary linkages; and the funding for this kind of research is beginning to appear, but in small amounts. Employees and employers need to become more knowledgeable about, and committed to, workplace research. Researchers need to become more sensitive to field conditions and applications, and they must address the differentiated concerns of workplace safety, health, and productivity. Methods for doing extensive on-site research must be clarified and related more systematically to these concerns.

One useful step for advancing this agenda might be to organize a council on drugs and the workplace, which would Cross disciplinary lines and include management, unions, clinicians, and consultants, as well as the research community. Such a council could assist in the design and dissemination of research applications and facilitate dialogue over the relevant issues, not only between researchers and industry, but also between different corporate departments and different industries.

Interactive Nature of Drugs, Individual, and Workplace

A major task for such a council would be to underscore the interactive nature and context of drugs, individual, and workplace. It would be very useful, for example, to disseminate effective, standardized instruments to collect and interpret data on job performance and correlate it with drug prevalence and intervention outcome measures. This would include:

- Developing indicator menus for performance difficulties that can be used by peers and supervisors (e.g., ways to recognize changes in performance over time);

- Demonstrating that peers and supervisors can reliably observe such signs (with appropriate training) and will record them, for example, in response to special keys on annual performance reviews;

- Demonstrating that many workers identified by such means indeed have problems with drugs, using, for example, a separate agency like an EAP to provide independent and accessible diagnostic expertise;

- Incorporating and tracking different kinds of effective, humane systems oftreatment and discipline so that fair tests of costs and benefits can be made.

While cross-sectional data on drug prevalence and impairment is valuable, longitudinal studies that show patterns of use might be more helpful in differentiating how often use can be contained and how often it leads to damages in specific work settings. Research programs should be designed to investigate each link along the causal chain that connects drug use with individual, local, and societal consequences. This kind of systematic research might not only answer cost-benefit questions about intervention approaches but also lead to early warning systems and improved modes of prevention.

Cooperation of Companies in Drug/Workplace Research

A second major area to address is how to gain the cooperation of a wider variety of companies in drug/workplace research programs. More intense study of drug effects in specific occupational and industrial categories is needed, with a commitment to over-sample those categories having the highest safety concerns. Feasibility considerations here include:

- Planning to ensure industry participation
- Agreement on key occupational groups
- Consultation with relevant regulatory and other agencies
- Identification of core variables to be measured

Attention should be given to how the workplace itself affects drug use, including how variables such as job type or design (e.g., high demand, low resource positions) may create pressures that engender drug use. It would be valuable to explore the possibility of subsuming drug use, detection, and intervention under broader workplace programs of health promotion and disease prevention. Perhaps lessons learned from successful disease- risk-reduction efforts in nutrition, exercise, and smoking cessation programs can be applied to this realm.

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