

noncontingent stimulation. Simultaneous determination of dopamine, norepinephrine and serotonin turnover rates in the same groups of animals also showed that, despite the identical electrical stimulation, dopamine and serotonin turnover in the nucleus accumbens and ventral tegmental area was different in animals receiving stimulation contingency vs. those receiving it noncontingently. These differences in glucose utilization and neurotransmitter turnover rates serve to emphasize the significance of the behavioral context of stimulus presentation in determining the neurochemical effects of a stimulus.

**TOXIC CONSEQUENCES OF CONTINGENT AND NONCONTINGENT COCAINE ADMINISTRATION.** Steven I. Dworkin. Wake Forest University, Bowman Gray School of Medicine, Winston-Salem, NC.

(Abstract not available)

**PATIENT CONTROLLED DRUG DELIVERY: IMPLICATIONS FOR SUBSTANCE ABUSE ISSUES.** James E. Smith. Wake Forest University, Bowman Gray School of Medicine, Winston-Salem, NC.

One of the defining features of substance abuse is the compulsion to repeatedly self-administer a drug to the detriment of both social and occupational functioning. Significant advances in understanding the etiology of drug abuse resulted from laboratory studies using the self-administration paradigm to investigate this component of drug abuse. Research in this area has elucidated behavioral, pharmacological and neurobiological factors related to engendering and maintaining compulsive drug taking. Nonetheless, several apparent anomalies have been observed in nonlaboratory settings. For example, iatrogenic drug use rarely leads to a substance abuse problem. In the past, several important procedural differences between the laboratory and clinical situation may have contributed to this differential effect. However, the advent of patient controlled analgesia (PCA) has provided the opportunity to more fully understand conditions resulting in drug abuse. Research on the use of PCA has indicated that patients use less drug over the course of treatment and discontinue drug use sooner when given control over dosing, as compared to traditional procedures. Thus, the contingent self-administration appears to result in a more evocative analgesic action and/or an attenuated reinforcing effect of these drugs. Evaluations of the behavioral and neurobiological mechanisms related to this enhanced therapeutic effect may increase our understanding of factors related to both drug abuse and more effective analgesic treatment.

## SYMPOSIUM

*Drug Use and Job Performance Indicators*

Chair: *Steven W. Gust*, Office of Workplace Initiatives, National Institute on Drug Abuse, Rockville, MD

Discussant: *J. Michael Walsh*, Office of Workplace Initiatives, National Institute on Drug Abuse, Rockville, MD

**INTRODUCTION.** Steven W. Gust. Office of Workplace Initiatives, National Institute on Drug Abuse, Rockville, MD.

Among the consequences of taking a drug are behavioral effects which result in impaired job performance. While there are a variety of physiological, pharmacological, and psychological variables that may affect an individual's response to a drug, generalizations regarding drug effects on performance have been established

concerning effects of dose, task complexity, task novelty, and task/duration interactions. Such generalizations, while certainly limiting the specificity with which one can predict whether a particular individual is capable of performing under a particular set of circumstances, nevertheless suggest that group and individual performance may be adversely affected by drug use. This group of papers focuses on recent research relevant to the impact of drug use on job performance. Such data is important because research data provides an empirical base for the development of effective workplace drug abuse policy and programming. These studies represent several perspectives, and use several experimental approaches, but all address an aspect of behavior relevant to worker performance. Data is presented from a field study of job performance indicators and drug use in the U.S. Postal Service, from a longitudinal survey of drug use and its correlates in a sample of young adults followed for 12 years, from a laboratory simulation of the effects of alcohol on management decision making, and from laboratory studies of drug effects on basic psychomotor and cognitive skills with implications for on-site performance assessment. An attempt has been made to bring together research from basic and applied areas bearing on this important issue in order to update the research community on recent research, help identify limitations of such data and additional research needs, and hopefully foster increased interest within the basic and applied research communities to address these important issues.

**THE RELATIONSHIP BETWEEN DRUG TEST RESULTS AND JOB PERFORMANCE INDICATORS.** Jacques Normand. Office of Selection and Evaluation, United States Postal Service, Washington, DC.

Drug test results were obtained from 5,465 job applicants as part of a blind, longitudinal study of preemployment drug testing. All job applicants who applied for a permanent position with the Postal Service and had their preemployment examinations performed by a Postal Service Medical Officer in one of 21 sites across the country submitted urine samples at the time of their medical examinations. A total of 4,375 job applicants were eventually hired and made up the study sample. This interim report summarizes information regarding the prevalence rate of positive drug test results and data relating to the strength of the relationship between drug test results, turnover, and absenteeism. When these interim analyses were performed, the average tenure of participating employees who had not separated was 8.2 months. Of all the eligible job applicants, 10 percent tested positive for drugs at the time of their medical examinations. The positive rate for new career hires was slightly lower than applicants. The overall positive rate of new hires was 8.8 percent. Thirty-one percent of the eligible job applicants who tested positive for drugs were not hired compared to 22 percent of those who tested negative. This suggests that those eligible applicants who tested positive for drugs were screened out either during the employment suitability process (i.e., the medical and personal check of suitability) or refused career appointments at a higher rate than those who tested negative. An analysis of prevalence rates by race, sex, and age group revealed that the odds of being positive were higher for Blacks, males, and people between the ages of 25 and 35. Those who tested positive were found to have an absence rate 41% greater than those who tested negative. A significant difference in involuntary turnover between the positive and negative groups was detected. The observed difference in involuntary turnover rates reveals that employees who tested positive had a 38.5% higher rate of involuntary separation than those who tested negative. When separate analyses were performed by individual drug types,

correlation coefficients of drug test results and the two outcome measures (i.e., absenteeism and involuntary turnover) ranged from 0.18 to 0.52.

**PERSONAL AND JOB CHARACTERISTICS OF DRUG USE IN THE WORKPLACE.** Michael D. Newcomb. University of Southern California, Los Angeles, CA.

Two perspectives have been taken to explain the use of drugs on the job. The first perspective suggests that various aspects of the job lead to using drugs while at work. A second viewpoint posits that the job characteristics are less important than the personal qualities or traits of the individual and that certain types of people will tend to use drugs on the job regardless of variations in specific job characteristics. Data is reported from a longitudinal study of young adults covering a four-year period. Latent variable analyses are used to separate a general tendency to use all types of drugs in the workplace from use of specific types of drugs while at work during the previous six months. This is the predicted or dependent variable in the model which was assessed at Time 2. The same disruptive drug use measures were gathered at Time 1, which provide the essential baseline assessments to control for stability over time. Three other latent constructs are also included in the model at both time points: Social Conformity (reflected by measures of law abidance, liberalism, and religiosity), Job Stability (frequencies of being fired and collecting unemployment insurance), and Job Satisfaction (reflected in measures of happiness and dissatisfaction with their current working conditions). Social Conformity was selected to reflect personal characteristics, since it has proven to be one of the best predictors of drug involvement. Final models are developed which assess the relative influence of prior disruptive drug use, personal qualities (Social Conformity), work history (Job Instability), and work characteristics (Job Satisfaction) on predicting later use of drugs in the workplace. Both standard and nonstandard effects are considered, which permit a richer and more complete description of what specific factors influence which specific outcomes. Such results provide valuable information about etiological factors for drug use in the workplace, and suggest strategies for both intervention and prevention efforts.

**IMPACT OF MODERATE ALCOHOL CONSUMPTION ON BUSINESS DECISION MAKING.** Sarah M. Jobs, Chad T. Lewis and Fred E. Fiedler. University of Washington, Seattle, WA.

This study investigates the effects of moderate alcohol consumption on the learning of and execution of a business decision-making task. Decision making was evaluated within the framework of Steele and Southwick's inhibitory response conflict model. Subjects were randomly assigned to one of four experimental conditions in a balanced placebo design; they expected and received an alcoholic beverage; they expected and received tonic only; they expected alcohol but received tonic; or they expected only tonic but received alcohol. Within these conditions, subjects were trained to participate in a business decision-making game and then made three successive ordering and pricing decisions. The results showed that although those who consumed a moderate amount of alcohol scored significantly more poorly on a short test of recall, alcohol did not uniformly affect decision-making outcomes. When subjects experienced high inhibitory response conflict (IRC) and had expected to consume alcohol (regardless of actual beverage consumed), their decisions tended to be significantly more extreme than for subjects who experienced high IRC

but had expected to consume only tonic. The expectation of consuming alcohol rather than alcohol consumption itself led subjects to overcorrect for previously poor decisions to a significantly greater extent under conditions of high IRC. This result contradicts the Steele and Southwick's model; theoretical and practical implications of these findings are discussed.

**DRUGS AND PERFORMANCE: IMPLICATIONS OF LABORATORY RESEARCH FOR ON-SITE ASSESSMENT.** Jack Henningfield, Phillip P. Woodson and Stephen J. Heishman. National Institute on Drug Abuse Addiction Research Center, Baltimore, MD.

Part of the rational basis for on-site assessment of biologic specimens for the presence of drugs of abuse is that such evidence of use may indicate impairment of performance. However, performance impairment cannot be reliably inferred on the basis of such data, except, possibly, when quantitative analyses reveal high levels of drug exposure. Objective and reliable methods of performance assessment are available, and, in principle, some could be implemented for on-site evaluations. Such performance assessment might be constrained by the same kinds of issues of sensitivity, accuracy, reliability, and validity that confront urine testing programs. The main purpose of this paper is to review some of the determinants of drug-induced impairment that should be considered in efforts to develop on-site performance assessment batteries. In brief, drugs may directly impair performance by impairment of sensory and perceptual capacities, and by impairment of motor abilities. Drugs may indirectly impair performance by altering the motivation to perform well, by setting the occasion for inappropriate behavior, by directly eliciting incapacitating responses, or by impairment of performance of tasks learned in a nondrug state. Development of performance batteries should consider the following issues: 1) Performance decrements can arise from drug abstinence as well as from drug administration; 2) abstinence related effects may differ in accordance with the history of the drug user, e.g., mild "hangover" decrements may accompany acute drug exposure, whereas physically-dependent users may suffer incapacitating decrements and only function at normal levels when taking their drug; 3) a wide range of performance batteries are available for the evaluation of different kinds of performance, e.g., grip strength, balancing tests, finger tapping, critical flicker fusion, psychomotor speed and accuracy tests, complex verbal behavior and memory tasks, and logical reasoning and complex decision making tasks are available; 4) the validity of the battery is related to its relevance to the work performance, e.g., a complex logical reasoning task may be irrelevant for a materials handler, whereas a finger tapping task may be irrelevant to the performance of a communications operator; 5) the contingencies for behavioral performance testing, themselves, can affect the outcome of the test results. Various issues discussed in this paper have arisen from laboratory research on performance effects of drugs. Although these issues complicate on-site performance evaluations, their consideration may enhance efforts to develop test batteries that are objective, reliable and valid.

#### SUNDAY P.M.

##### POSTER SESSION

*Cultural and Environmental Determinants of Behavior*

**DEPRESSION AND DRUG USE IN MEXICAN-AMERICAN YOUTH.** Stephanie S. Smith, D. Dwayne Simpson and Donald Woods. Texas A&M University, College Station, TX.