

EVALUATION OF DRUG TESTING IN THE WORKPLACE: STUDY OF THE CONSTRUCTION INDUSTRY

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ABSTRACT: During the past two decades, drug testing in the workplace has gone from virtual nonexistence to widespread employer acceptance. This growth is particularly critical for the construction industry. High rates of alcohol and other drug use, coupled with the high-risk, safety-sensitive nature of the industry, have prompted the implementation of a variety of drug surveillance and prevention strategies. Despite this growing vigilance, however, no scholarly works have examined the impact of drug-related policies in the construction industry. The present study investigates the efficacy of workplace drug-testing programs in reducing injury incident rates and workers' compensation experience-rating modification factors within the construction industry. Analyses indicate that companies with drug-testing programs experienced a 51% reduction in incident rates within 2 years of implementation. Furthermore, companies that drug test their employees experienced a significant reduction in their workers' compensation experience-rating modified factors. Policy implications are discussed in light of the current findings.

THEORETICAL FRAMEWORK

During the past two decades, drug testing in the workplace has gone from virtual nonexistence to widespread employer acceptance. In 1983, less than 1% of employees were subject to drug testing. Today, approximately 49% of full-time workers between the ages of 18 and 49 are subject to some type of workplace drug testing (SAMHSA 1999). This growth is particularly evident in the construction industry. High rates of alcohol and other drug use, coupled with the high-risk, safety-sensitive nature of the industry have prompted the implementation of a variety of drug surveillance and prevention strategies. The U.S. Department of Health and Human Services reports that the construction industry has a higher percentage of current illicit alcohol and other drug users than any other occupation category. It was estimated that in 1997, 14.1% of full-time construction workers between the ages of 18 and 49 were current illicit drug users and that 12.4% engaged in heavy alcohol use. This percentage is nearly double the national average for all industries, 7.7 and 7.6%, respectively (SAMHSA 1999).

Despite having the highest percentage of substance-abusing workers, the construction industry ranks near the bottom for industries that drug test. In 1997, 25.8% of full-time construction workers between the ages of 18 and 49 reported that their employer screened applicants for drugs—25.7% said that they were subject to random testing, 22.4% were subject to "for-cause" testing, and 27.2% were subject to postaccident testing (SAMHSA 1999). The national averages for all industries in 1997 were 38.6, 25.4, 30.1, and 28.7% respectively (SAMHSA 1999). Furthermore, in 1997, only 55.6% of full-time construction workers between the ages of 18 and 49 reported that their workplace had a written policy concerning alcohol or other drug use. The national average reported in 1997 was 70.3% (SAMHSA 1999).

Despite several studies that have examined the prevalence of substance use in the workplace (Lund et al. 1989; Voss 1989; Moody et al. 1991; Osborn and Sokolov 1991; Kaestner and Grossman 1998), only a minimal number of scholarly

works have examined the relationship between drug testing and accidents and illness rates (Crouch et al. 1989; Blank and Fenton 1989; McDaniel 1989; Norman and Salyards 1989; Feinauer and Havlovic 1993). Feinauer and Havlovic (1993), for example, explored the relationship between drug testing and accident and illness rates at 48 Wisconsin businesses between 1984 and 1985. Two primary hypotheses were tested. First, that businesses with drug testing procedures had fewer occupational injury rates compared to companies that did not drug test (Feinauer and Havlovic 1993). Second, that businesses with postaccident drug testing had reduced injury rates compared to their pretesting period and companies with only preemployment drug testing procedures (Feinauer and Havlovic 1993). Analyses indicated that the 12 facilities with a drug-testing program did not experience significant reductions in accident and illness rates compared to the 36 non-drug-testing organizations (Feinauer and Havlovic 1993). Of the 12 facilities that did drug test, however, "post-accident drug testing was significantly related to a decrease in accident and illness rates compared to the pre-testing period and to facilities using only pre-employment testing" (Feinauer and Havlovic 1993).

Despite this literature, no scholarly works have been published on the construction industry. Furthermore, no studies have examined the effect of substance abuse on workers' compensation experience-rating modification factors (MODs). In the current study, these methodological limitations are addressed. First, we measure the perception of substance abuse problems in the construction industry. Second, we identify factors that may influence the implementation of workplace drug-testing programs in the construction industry. Third, we determine what impact drug testing has on company performance indicators. Fourth, we measure the effect of drug testing on company incident rates and MODs. The project methods are described below.

METHODS

Two primary research approaches were utilized. First, to explore factors affecting the implementation of workplace drug-testing programs and their effectiveness, an attitudinal questionnaire was administered to company officials (e.g., owners, human resources managers, and safety directors) in the construction industry. Second, longitudinal and cross section analyses were performed meta-analytically to assess the effectiveness of workplace drug-testing programs on reducing company injury incident rates and MODs. Incident rate data were obtained from questionnaire responses. The National Council on Compensation Insurance (NCCI) provided MODs for those

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TABLE 1. Distribution of Companies and Respondents

Variable	Count	Percent
Number of annual work hours		
Up to 99,999	14	31.8
100,000–199,999	7	15.9
200,000–499,999	15	34.1
500,000 or more	8	18.2
Union status		
Union	26	39.4
Non-union	40	60.6
Year of drug testing implementation		
1985–1987	5	10.2
1988–1990	7	14.3
1991–1993	9	18.4
1994–1996	12	24.5
1997–1999	16	32.6
Position of respondent		
Personnel, human resources	9	13.0
Director of safety, risk management	16	23.2
Vice-president, CFO, manager, administrator, controller	15	21.7
CEO, president, owner	24	34.8
All other	3	4.4
Unknown	2	2.9

TABLE 2. Experience-Rating Modification Factors for Study Sample

Year	Companies that drug test	Companies that do not drug test	All companies
1995	0.923	0.935	0.926
1996	0.936	0.955	0.941
1997	0.895	0.957	0.914
1998	0.898	0.982	0.922
1999	0.833	0.958	0.871
2000	0.842	0.950	0.870

companies located in states where the NCCI is the official rating bureau. Where possible, the NCCI provided MODs for the years 1995 through 2000.

Questionnaire Data

A total of 405 construction companies were solicited to participate in this study. These companies were chosen randomly from the national membership directory of the Associated General Contractors (AGC). No distinction was made between company size, location, or type of service provided. The presence of a drug-testing program was not known prior to solicitation. Companies were selected randomly and subsequently sent a cover letter and four-page questionnaire via facsimile. The questionnaire was designed for companies both with and without drug-testing programs in place. A total of 69 companies (17%) responded with enough data to be eligible for inclusion. Of these 69, 49 (71%) had a drug-testing program in place at the time of the survey.

Characteristics of the companies and participating respondents are illustrated in Table 1. As shown, more than half of the companies in the study sample were firms with 200,000 annual work-hours or more, or more than 100 employees. According to the U.S. Department of Commerce (USDOC), the

vast majority of the 667,000 construction firms in the United States employ fewer than 10 workers (USDOC 1997). In 1997, less than 3% of workers employed in the construction industry were employed by companies with more than 50 people (USDOC 1997). A majority of respondents (61%) reported that their worksites were open-shopped (union membership not required). Over 50% of the employers with drug-testing programs reported that their policies had been implemented after 1994. Thirty-five percent of respondents identified themselves as a company president or owner.

Workers' Compensation Experience-Rating Modification Factors (MODs)

Workers' compensation laws mandate that if a person is injured while in his/her role as an employee, the employer is automatically liable for medical care and partial replacement of wages. As such, workers' compensation provides employers with effective financial incentives to implement workplace safety programs and policies, such as drug testing (Kahley and Sornberger 1995). The incentives of these programs to prevent workplace injuries and illnesses can be observed through experience rating. Experience rating is a statutorily mandated program designed to charge certain employers insurance premiums based on individual past loss experience. The experience is used to calculate the premium by using a formula modification, or MOD, that compares the employer's actual loss record to the overall average for its particular business type in the state. Each business, according to its industry, has an annual number of expected workers' compensation losses. If the company's losses equal the industry standard for that year in that state, its experience-rating modification factor is 1.00.

Safer-than-average firms have a MOD lower than 1.00. Conversely, firms with higher-than-average losses have a MOD higher than 1.00. Practically, a modification of 1.50 increases a \$300,000 premium to \$450,000. The appropriate rating bureau (i.e., NCCI) typically computes and promulgates experience-ratings annually and provides this information to the insurance carrier for calculation of the policy premium. Table 2 provides the average MODs by year.

DATA ANALYSIS AND FINDINGS

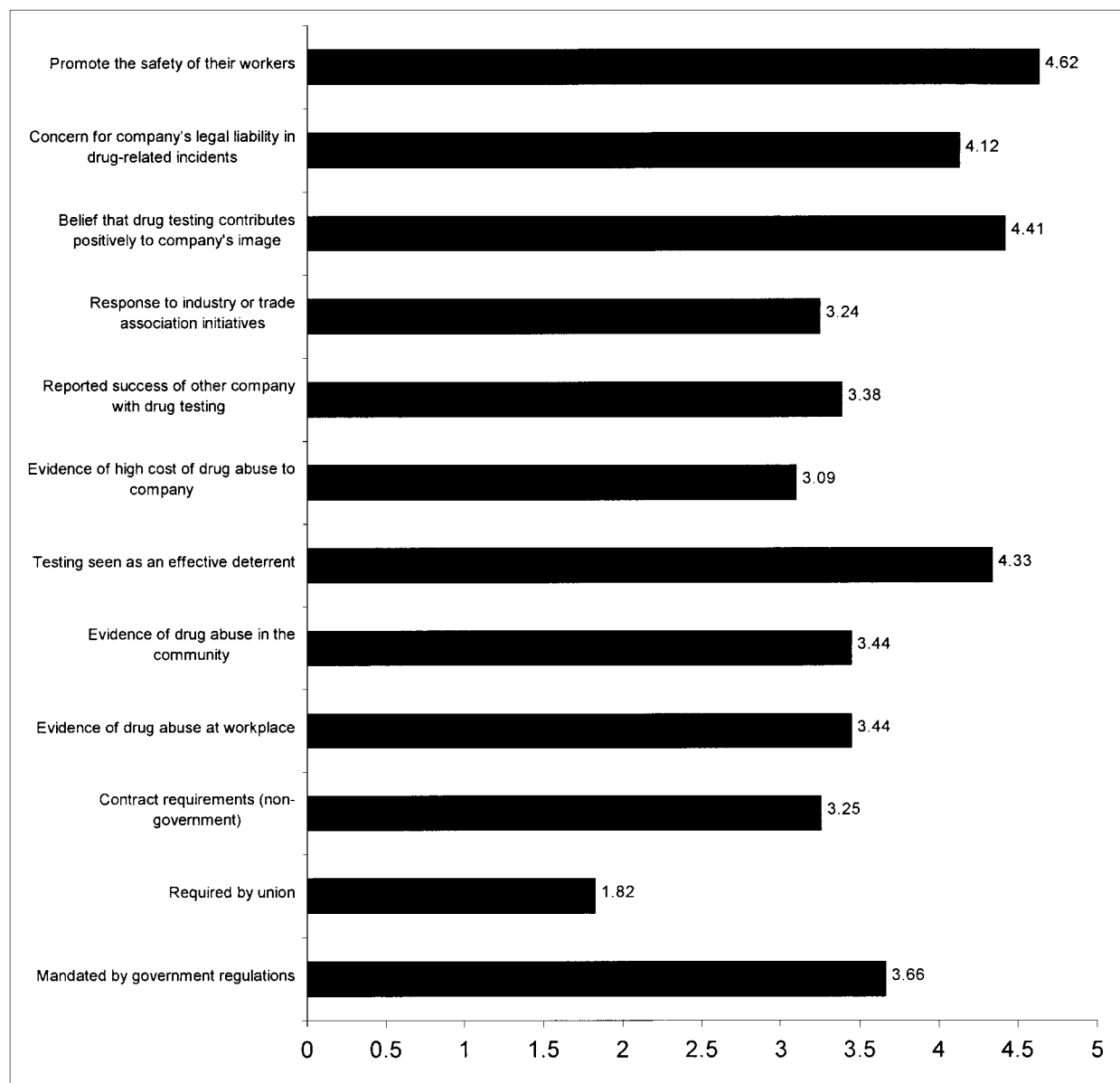
Data analysis was accomplished in three distinct phases. First, questionnaire results were examined for respondent perceptions of the magnitude of substance abuse in the construction industry; for factors affecting the implementation of drug-testing programs in the construction industry; for factors affecting the nonimplementation of drug testing programs in the construction industry; and for perception about the effectiveness of drug testing in the construction industry. Second, meta-analytical techniques were utilized to examine drug testing and company incident rates. Third, meta-analysis explored drug testing and experience-rating.

Perception of Substance Abuse in the Construction Industry

Respondent perceptions of the magnitude of substance abuse in the construction industry are presented in Table 3.

TABLE 3. Respondent Perceptions of Substance Abuse in the Construction Industry

Problem type	Companies That Drug Test		Companies That Do Not Drug Test		All Companies	
	Count	Percent	Count	Percent	Count	Percent
A very serious problem	8	21.1	1	5.6	9	16.1
A moderately serious problem	23	60.5	10	55.6	33	58.9
An insignificant problem	6	15.8	4	22.2	10	17.9
A very insignificant problem	1	2.6	3	16.7	4	7.1
No problem at all	0	0.0	0	0.0	0	0.0



Means are based on the following scale: 1 = Very Unimportant, 2 = Unimportant, 3 = Neutral, 4 = Important, 5 = Very Important

FIG. 1. Factors Affecting Implementation of Drug-Testing Programs

The majority of respondents, regardless of whether their company drug tests, asserted that alcohol and other drug abuse is a moderately serious problem affecting construction companies in the United States. As shown, all of the respondents reported that substance abuse in the construction industry was a problem to some degree.

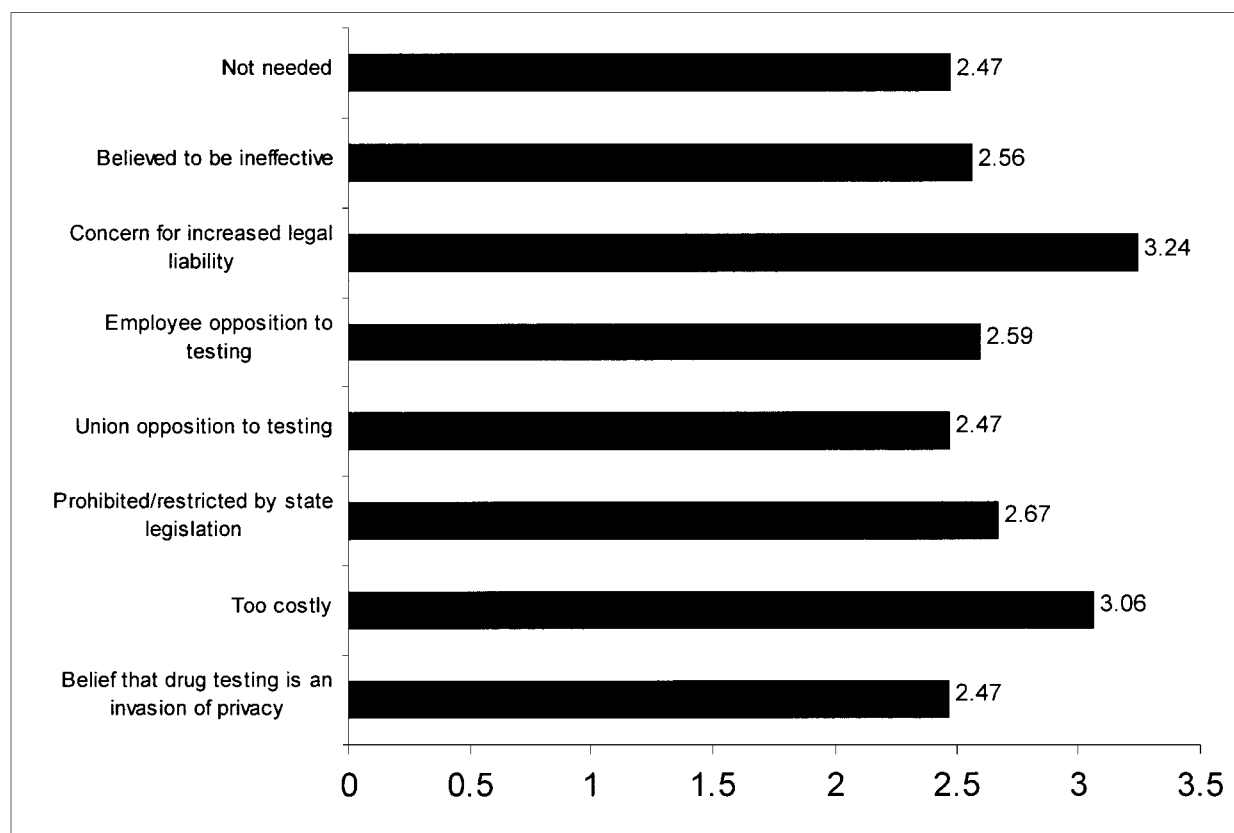
Implementation of Drug-Testing Programs in the Construction Industry

Respondents were asked to rate the relative importance of 12 factors in their decision to implement a drug-testing program. The rating scale ranged from 1 to 5, with 1 being "very unimportant" and 5 being "very important." Fig. 1 displays the mean scores for the responses. The top three reasons for implementation were: (1) to promote the safety of their workers and those who use their products and services (4.62); (2) a belief that drug testing contributes positively to a company's image (4.41); and (3) as an effective deterrent (4.3). The only factor that was rated as being unimportant was union requirements (1.82).

Nonimplementation of Drug-Testing Programs in the Construction Industry

Respondents who indicated that their companies did not drug test were asked to rate the importance for each of eight reasons in their company's decision not to implement a program. Fig. 2 displays the mean scores of their reasons. As shown, the top three reasons mentioned were: (1) a concern for increased legal liability (3.24); (2) too costly (3.06); and (3) prohibited/restricted by state legislation (2.67). No factors were considered unimportant.

To gain a better understanding of potential inhibitors of the implementation of drug testing, a regression was conducted to examine the structural differences between respondent companies that drug test and that do not drug test. The company characteristics studied were: (1) company size; (2) union status; (3) state laws governing an employers' right to drug test; and (4) the magnitude of company incident rates before testing. The regression results are presented in Table 4. As shown, the nature of state laws is a significant determinant ($p < 0.01$) of a company's decision or capability to implement



Means are based on the following scale: 1 = Very Unimportant, 2 = Unimportant, 3 = Neutral, 4 = Important, 5 = Very Important

FIG. 2. Factors Affecting Nonimplementation of Workplace Drug-Testing Programs

TABLE 4. Regression Analysis of Company Characteristics on Implementation ($N = 40$)

Variable	Definition	Coefficient
Constant	—	0.5865
Company size	Average total company work-hours in 1997–1998 (per 200,000 work-hours)	0.0769 (2.56) ^a
Union status	Variable = 1 if company hires only through a union	−0.0027 (−0.02)
State laws	Variable = 1 if company is located in state with prohibitive or restrictive drug testing legislation	−0.4762 (−3.13) ^b
Magnitude of company incident rates	For companies that drug test: INRTB For companies that do not drug test: average incident rate in 1997 and 1998	0.0122 (1.71)
F statistic	—	4.56
R-squared	—	34.2%

Note: T-statistics are provided in parentheses.

^aSignificant at $p < .05$.

^bSignificant at $p < .01$.

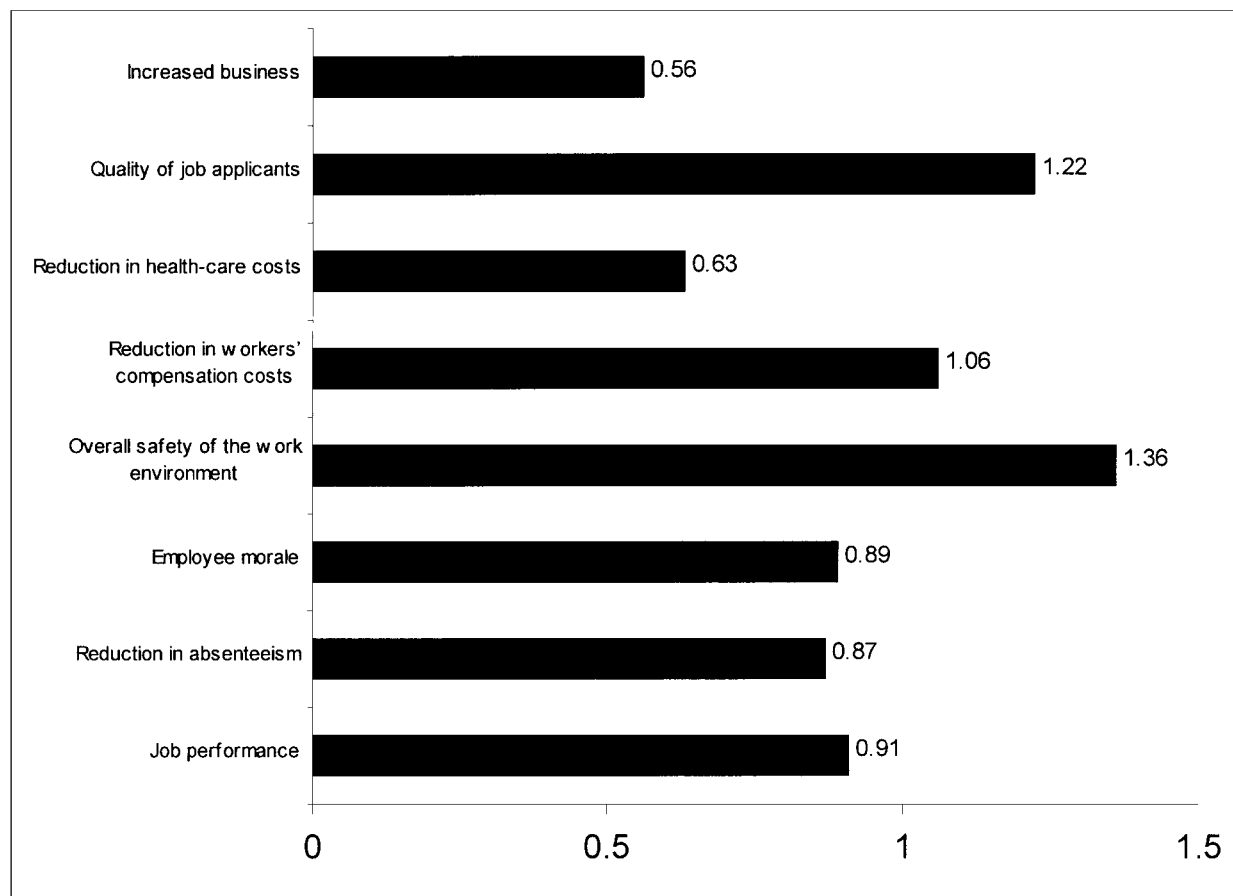
a drug-testing program. At the time the survey was administered (December 1999), six states had restrictive or antidrug-testing laws—Minnesota, Montana, Maine, Connecticut, Rhode Island, and Vermont. While the laws in each of these states differ, they all substantially limit the employers' right to drug test his/her workers. It is often very difficult for employers in these states to implement such a program without facing serious legal liability. In these states, the probability of adopting a drug-testing program fell by 47%, with all other factors held constant.

It is also logical that there is a strong relationship between company size and the decision to implement drug testing. According to the U.S. Department of Health and Human Services, small workplaces (fewer than 25 employees) are least likely to have a drug-testing program in place (SAMHSA 1999). In 1997, about three-fourths (73.6%) of full-time workers employed in large establishments (500 or more employees) reported that their workplace had at least one type of work-

place testing program (SAMHSA 1999). Slightly more than half (57.5%) of employees in medium-size establishments (25 to 499 employees) reported at least one type of workplace testing program; 27.5% of small-size companies (less than 25 employees) reported that their workplace had at least one type of workplace testing program (SAMHSA 1999).

Perceived Effectiveness of Drug Testing in the Construction Industry

Respondents were asked to rate the impact of their company's drug-testing program on several organizational indicators, including job performance, absenteeism, employee morale, safety of the work environment, workers' compensation and health care costs, quality of the job applicants, and the level business in general. The rating scale ranged from +2 to −1 with +2 being "significant improvement," +1 being "some improvement," 0 being "no impact," and −1 being



Means are based on the following scale: -1 = Adverse Impact, 0 = No Impact, 1 = Some Improvement, 2 = Significant Improvement

FIG. 3. Impact of Drug-Testing Programs

TABLE 5. Injury Incident Rates for Study Sample

Year	Companies that drug test	Companies that do not drug test
Two years prior to implementation	8.79	—
One year prior to implementation	8.66	—
One year after implementation	4.61	—
Two years after implementation	5.06	—
INRTB ^a	8.92	—
INRTA ^b	4.36	—
Change	-4.56	—
RChange	-51.1%	—
1997	4.87	5.13
1998	4.15	6.32

^aIncident rate *before* implementation of drug testing.

^bIncident rate *after* implementation of drug testing.

“adverse impact.” As shown in Fig. 3, company officials generally believed that their drug-testing program had a positive impact on all organizational indicators. Drug-testing programs made the most positive impact on the overall safety of the work environment (1.36), quality of job applicants (1.22), and reducing workers’ compensation costs (1.06). The least significant improvement was experienced in the overall level of business. No organization performance indicator was perceived by respondents to be impacted adversely by drug testing.

Drug Testing and Company Incident Rates

The construction industry has taken great strides to improve the safety and health on construction worksites. Since 1988,

injury incident rates for the construction industry population have fallen steadily. Between 1988 and 1998, the industry’s injury incident rate decreased more than 40% from 14.6 injuries per 200,000 work-hours to 8.8 injuries per 200,000 work-hours (Bureau 2000). This section will examine whether this steady decrease can be ascribed (at least in part) to the implementation of drug-testing programs in construction firms in recent years.

Incident rates, as defined by the Occupational Safety and Health Administration, are the total recordable occupational injuries and illnesses per 100 full-time workers (or 200,000 work hours) per year. The variable INRTB, shown in Table 5, is defined as the incident rate *before* the implementation of drug testing, while INRTA is the incident rate *after* the implementation of drug testing. The average company that drug tests in the study sample reduced its injury incident rate 51% within 2 years of implementation, from a rate of 8.9 injuries per 200,000 work-hours to 4.4 injuries per 200,000 work-hours. (By sorting the study sample according to particular company structural factors, further observations were studied. Cross section analyses of change (INRTB–INRTA) versus particular company structural factors revealed that no significant correlation exists between the decline in company injury incident rates following the implementation of drug testing and company size, union status, and recent significant company growth.) The average injury incident rates for all respondents by year in relation to the year of implementation (for companies that drug test only), as well as for the years 1997 and 1998 (for both companies that do and do not drug test), are provided in Table 5. For the fundamental hypothesis that company injury incident rates decrease significantly following the

implementation of a drug-testing program, a paired t -test was conducted. It was found that $t = -6.298$ with a probability less than or equal to 0.0001 that the null hypothesis cannot be rejected. That is, the difference in the mean incident rates before and after the implementation of a drug-testing program (change) is significant at the 0.01 level.

Drug Testing and Experience Rating

The experience period used to determine an employer's MOD generally consists of three completed years of experience ending one year prior to the effective date of the modification. For a rating effective January 1, 2000, for example, the experience period would contain experience from policies effective January 1, 1996, January 1, 1997, and January 1, 1998. To test the null hypothesis that company MODs in 2000 and 1995 are equal, separate paired t -tests were conducted for both companies that drug test and those that do not drug test. Only companies that implemented drug testing between 1994 and 1996 were included in this analysis. The 1995 MOD for these companies represents the MOD prior to implementing a drug-testing program. The 2000 MOD for these companies represents the MOD after implementing a drug-testing program. Because MODs are calculated using three completed years of experience, it was not considered necessary to take the average of several years of MOD data as an estimate of observation.

For companies that do drug test, it was found that $t = -8.935$ with a probability less than or equal to 0.0001 that the null hypothesis cannot be rejected (Table 6). This suggests that the difference in the mean workers' compensation experience-rating modification factors in the years 2000 and 1995 is significant ($p < 0.01$). Thus, it can be concluded that the MOD before and after drug testing were significantly different for companies that drug test. For companies that do not drug test, it was found that $t = 0.8606$ with a probability 0.4078 that the null hypothesis cannot be rejected. This result suggests that companies that do not drug test did not experience a significant decline (or increase) in its MODs between 2000 and 1995. The findings from this analysis suggest that drug testing is highly effective in reducing construction site injuries. Between 1995 and 2000, the average company that implemented drug testing between 1994 and 1996 experienced an 11.4% reduction in its MOD, from 0.973 to 0.862 ($p < 0.01$). During this same time period, the average company that does not drug test experienced a 1.6% increase in its MOD.

To test whether the effectiveness of drug testing in reducing MODs is consistent over time, multiple regression analysis was performed. The ratio 2000 MOD/1995 MOD was regressed on a set of indicator variables indicating the year drug testing was implemented in a particular company (X_i). The results of this regression are reported in Table 7. As shown, the impact of drug testing in reducing MODs persists over time and is most effective in the first three years immediately following the implementation of a program. Companies that implemented drug testing in 1993 and 1994 experienced the greatest difference in MODs between the years 2000 and 1995. Companies that implemented drug testing prior to 1993, or after 1994, experienced less significant declines, suggesting that drug testing is effective in reducing company MODs and that the effect persists, but does not continue to grow, past the first few years.

DISCUSSION

Companies can no longer afford to remain idle and allow alcohol or other drug use to plague their workplace. For employees in the construction industry, the consequences of substance use can be tragic not only for users and their families,

TABLE 6. Changes in Experience Ratings for Study Sample ($N = 22$)

Variable	Companies that drug test	Companies that do not drug test
Companies	10	12
1995 MOD	0.973	0.935
2000 MOD	0.862	0.95
Change	-.111 ^a	0.015 ^a
RChange	-11.41%	1.60%
t (H_0 : Change = 0)	-8.935	0.861
Probability	<0.0001	0.4078

^aSignificant at $p < .01$.

TABLE 7. Regression Analysis of Experience Ratings by Year of Program, Implementation ($N = 33$)

Year	Coefficient
1987	-0.0277 (-.503)
1989	-0.0374 (-.784)
1990	-0.0543 (-.806)
1991	-0.0848 (-1.69)
1992	-0.1018 (-1.85)
1993	-0.1323 (-2.63) ^a
1994	-0.1351 (-2.69) ^a
1995	-0.1105 (-2.20) ^a
1996	-0.0806 (-1.69)
1997	-0.0378 (-.841)
F statistic	1.86
R-squared	45.8%

Note: T-statistics are provided in parentheses.

^aSignificant at $p < 0.05$.

but also for coworkers and customers who are put at risk. Employers not only have a right to strive to maintain a workplace free from substance use, they have a responsibility to implement a fair, consistent, and equitable drug-abuse prevention strategy with due consideration of the rights, responsibilities, and interests of all concerned parties. It is important to understand, however, businesses must not conceive of drug testing as a substitute for effective drug education and rehabilitation. Nor does it constitute a complete safety and health program when implemented alone. All drug testing must be conducted as part of a comprehensive drug-prevention program aimed at preventing and managing substance abuse in the workplace.

There are a number of policy implications for the current study. First, it is important for policymakers to insure that small businesses are able to obtain cost-effective drug testing services. This can be accomplished by increasing government subsidies, providing tax credits, and/or mandating discounts on workers' compensation insurance premiums to companies with qualified substance-abuse prevention programs that include drug testing and proper education and rehabilitation programs. Currently, nine states (Alabama, Florida, Georgia, Mississippi, Ohio, South Carolina, Tennessee, Virginia, and Washington) have voluntary workers' compensation premium reduction laws that enable employers to receive a 5–20% discount on their workers' compensation insurance. The results from this study suggest that these programs successfully influence employers' decisions to implement substance-abuse prevention programs that include drug testing. These programs should be expanded to include discounts on health insurance and general liability insurance premiums.

Second, because government contractual requirements (both Federal and state) requiring mandatory substance-abuse prevention policies and programs have a significant positive effect on the development of these programs, these requirements should be considered a powerful tool in the battle against substance abuse in the workplace. Such incentives can make pos-

sible an investment in the workforce that is otherwise prohibitive.

Third, state laws prohibiting or restricting an employers' right to drug test should be reviewed and, if necessary, modified to enable companies to implement cost-effective programs. Currently, six states have restrictive or antidrug-testing laws (Minnesota, Montana, Maine, Connecticut, Rhode Island, and Vermont). While the laws in each of these states differ, they all substantially limit the employers' right to drug test his/her workers.

Fourth, business owners should be assisted in better diagnosing the need for drug testing by industry/trade associations and unions. One of the strongest factors to influence implementation revealed by the questionnaire results was a perception of need. Therefore, it is important that employers be able to identify whether substance abuse is plaguing their workplace and the industry in general. Furthermore, it is important that they be provided reliable and up-to-date information.

Several methodological limitations should be noted. Because the sample was not large enough to break down by category, all drug-testing programs were treated equally. In cases of a company implementing different drug testing types in different years, the first type implemented was considered the beginning of the policy implementation. Furthermore, no distinction was made between general contractors and subcontractors.

The ideal research vehicle for examining the issues presented in this report would be individual claim data that include the direct cause of the incident, from a variety of construction firms and under a variety of circumstances. To our knowledge, such data do not exist. The present analysis is offered as an alternative strategy for evaluating this important public policy issue. Furthermore, the reader is cautioned that the construction companies included in the sample were only those willing to participate. The average company in the study sample may not accurately reflect the average construction firm in the United States. As a result, questionnaire responses, as well as changes in company injury incident rates and experience ratings, may reflect factors other than the implementation of drug testing.

The authors urge employers to use caution and make informed decisions on whether drug testing is right for their company. We also reiterate that drug testing does not, in and of itself, constitute a drug-abuse prevention program. Rather, it is only one component of what should be a comprehensive program that includes other key elements, such as a written policy, employee involvement and communication, employee drug awareness and education, supervisor training, and rehabilitation and treatment.

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