Workplace Substance-Use Norms as Predictors of Employee Substance Use and Impairment: A Survey of U.S. Workers*

MICHAEL R. FRONE, PH.D.,[†] AND AMY L. BROWN, PH.D.[†]

Research Institute on Addictions, State University of New York at Buffalo, 1021 Main Street, Buffalo, New York 14203

ABSTRACT. Objective: Although much research has explored the relation of substance-use norms to substance use among college students, much less research has focused on employed adults and the workplace as a social context for social norms regarding substance use. This study explored the relation of descriptive and injunctive workplace substance-use norms regarding alcohol and illicit drug use to employee substance use. Both alcohol use and illicit drug use were explored, as well as overall and context-specific use and impairment. **Method:** Data were collected from a national probability sample of 2,430 employed adults (55% female) using a random-digit-dial telephone survey. Overall employee alcohol and illicit drug use were assessed, as well as use before work, use and impairment during the workday, and use after work. **Results:**

After controlling for a number of potential covariates, injunctive norms regarding workplace alcohol and illicit drug use predicted substance use and impairment overall and across all contexts of use. Descriptive norms predicted alcohol and illicit drug use before and during work, as well as workplace impairment. **Conclusions:** This study shows that both workplace injunctive and descriptive norms are important predictors of substance use in the U.S. workforce. There were two general patterns, however, that were consistent across both alcohol and illicit drug use. Social norms marketing campaigns, therefore, may be a useful way for employers to target employee substance use. The present results also helped to integrate the results of several prior studies that employed narrower samples and measures. (*J. Stud. Alcohol Drugs*, 71, 526-534, 2010)

UNDERSTANDING THE PREDICTORS of employee substance use is important for several reasons. First, overall impairment from and work-related use of alcohol and illicit drugs are prevalent in the workforce at large and in particular subgroups. When asked about drinking enough alcohol to become intoxicated, 30.6% of working adults in the United States reported doing so at least once in the past year. Broken down by frequency of drinking to intoxication, 20.9% of workers drank to intoxication less than one day per month, 6.4% of workers drank to intoxication one to three times per month, and 3.4% of workers drank to intoxication once per week or more often (Frone, 2008b). Looking at impairment from illicit drug use, 11.2% of workers reported being impaired at least once during the past year. Broken down by frequency of impairment by illicit drugs, 3.6% of workers reported being impaired by an illicit drug less than one day per month, 1.9% reported being impaired by an illicit drug one to three times per month, and 3.6% reported being impaired by an illicit drug once per week or more often (Frone, 2006b). In specific subgroups, the 12-month prevalence of impairment from the use of illicit drugs is much higher; for example, 42.6% of young women

in high-risk occupations and 37.2% of young men in high-risk occupations reported being impaired by an illicit drug (Frone, 2006b).

Substance use also occurs in relation to the workday. A national survey of U.S. workers found that in the prior year, 15.3% of the U.S. workforce reported drinking before work, drinking during work hours, or working under the influence of alcohol (Frone, 2006a). Illicit drug use before work or during work hours was reported by 3.1% of the workforce, and working under the influence of illicit drugs was reported by 2.9% of the workforce (Frone, 2006b). Furthermore, the 12-month prevalence of workplace illicit drug use and impairment is higher in specific vulnerable subgroups. Among young women in high-risk occupations, for example, 10.6% reported workplace illicit drug use and 11.4% reported workplace drug impairment. Among young men in high-risk occupations, 28.0% reported workplace illicit drug use and 26.3% reported workplace drug impairment (Frone, 2006b). In addition to its prevalence, overall employee impairment from alcohol and illicit drugs may lead to work-related absenteeism (Frone, 2008b) and to injuries incurred outside the workplace (e.g., Cherpitel, 2007; Macdonald et al., 2003) and health-related problems (Rehm et al., 2006) that may have relevance to employers. Work-related employee substance use and impairment may be related to decreased productivity and increased risk of accidents and injuries at work (Frone, 2008b; Normand et al., 1994). Last, exposure to employee substance use in the workplace is related to several negative outcomes (poor workplace safety, increased

Received: June 30, 2009. Revision: November 24, 2009.

*Data collection was supported by National Institute on Alcohol Abuse and Alcoholism grant R01-AA12412 awarded to Michael R. Frone.

[†]Correspondence may be sent to Michael R. Frone at the above address or via email at: frone@ria.buffalo.edu. Amy L. Brown is with the Department of Psychology, University of Louisiana at Lafayette, Lafayette, LA.

work strain, and decreased morale) among workers who do not use substances at work (Frone, 2009).

Given these prior findings, it is not surprising that researchers have devoted increasing attention to the predictors of overall and work-related employee substance use. However, the vast majority of research has focused on work stressors (e.g., work demands, lack of job control, job insecurity) as potential causes of employee substance use, in particular employee alcohol use (Frone, 1999, 2008a). In contrast, relatively little research has explored the role of workplace social influences on employee substance use, despite general theories of social influence (Cialdini and Trost, 1998; Petraitis et al., 1995) and specific theories of the social availability of alcohol (Ames and Janes, 1992; Smart, 1980) suggesting that prescriptive social norms may play a prominent role in the promotion of substance use. Consistent with these theoretical models, a large literature shows that a strong predictor of heavy drinking among adolescents (i.e., high school and college students) is their perception of the prescriptive drinking norms of their peers (Borsari and Carey, 2001; Neighbors et al., 2007; Perkins, 2002). Social norms also have been found to predict illicit drug use among adolescents (Elek et al., 2006; Neighbors et al., 2008; Verkooijen et al., 2007); the substance use of adolescents is influenced by both descriptive (perceptions of how much others drink/use drugs) and injunctive (perceptions of how much others approve of drinking/using drugs) norms (Borsari and Carey, 2003; Elek et al., 2006; Neighbors et al., 2007).

Although the link between social norms and substance use among adolescents has been widely demonstrated, much less research has explored the relation between social norms and substance use among other populations (e.g., working adults). Most adults spend a large portion of their waking hours at work, and the workplace represents a major social context in which social norms about substance use at work can develop and be acquired (Ames and Janes, 1992; Trice and Sonnenstuhl, 1990). The few studies that have explored workplace social norms and employee substance use have provided findings supporting theories of social influence and substance use. Using a random sample of manufacturing workers, for example, Ames et al. (2000) found that descriptive and injunctive workplace alcohol norms were each positively related to drinking at work, and descriptive workplace alcohol norms, but not injunctive workplace alcohol norms, were positively related to drinking before work. Using a convenience sample of adolescent workers holding a variety of jobs, Frone (2003) found that workplace descriptive marijuana norms were positively related to overall marijuana use but workplace descriptive alcohol norms were not related to overall alcohol use. In addition, workplace descriptive alcohol and marijuana norms were positively related to alcohol and marijuana use in the workplace, respectively. Bacharach et al. (2002) used a random sample of blue-collar workers

drawn from eight unions to explore the relation of permissive coworker drinking norms to overall alcohol-related problems. Although they found a positive relation between these two constructs, the measure of norms that was used confounded descriptive and injunctive norms by averaging across items assessing descriptive norms regarding overall alcohol use and injunctive norms regarding alcohol use during lunch breaks and after work.

These findings are important because they begin to show that social interaction at work leads to the development of norms regarding substance use at work and that these social norms may be related to employee substance use overall and in the workplace. Nonetheless, there are several issues that need further attention. First, research on workplace social norms among employed adults has focused almost exclusively on alcohol use (Ames et al., 2000; Bacharach et al., 2002). Only one study explored employee marijuana use (Frone, 2003). Second, only one study explored both overall substance use and substance use during the workday (Frone, 2003). No research has explored whether workplace substance-use norms predict working while impaired by alcohol or illicit drugs, or alcohol or illicit drug use right after work. Third, only one study explored the simultaneous relations of descriptive and injunctive workplace norms to employee substance use (Ames et al., 2000). Last, the small literature on workplace substance-use norms has used samples that represent narrow sections of the workforce.

Therefore, the current study extends previous research by using a large national sample of adults ages 18-65 employed in the U.S. civilian workforce. Participants were surveyed about workplace descriptive and injunctive norms regarding alcohol and illicit drug use and their own use of alcohol and illicit drugs in a number of contexts (before work, during the workday, after work, and overall use). They also were asked about working while impaired by alcohol or illicit drugs. Based on the collective research with adolescents and the little research with employed adults, we hypothesized that both workplace descriptive and injunctive norms would predict overall employee alcohol and illicit drug use; employee alcohol and illicit drug use before, during, and after the workday; and working while impaired by alcohol or illicit drugs.

Method

Sample and study design

The 2,829 study participants took part in the National Survey of Workplace Health and Safety. This telephone survey was designed to explore a wide range of issues related to employee health, safety, and other employment outcomes (e.g., work stress, physical health, mental health, substance use, workplace injuries, work-related attendance, and work attitudes). The population from which the study participants

were sampled was all noninstitutionalized adults ages 18-65 years who were employed in the civilian labor force and who resided in households in the 48 U.S. contiguous states and the District of Columbia. The sample of telephone numbers was generated by Survey Sampling International. A 1+ listed-assisted design was employed (Tucker et al., 2002) to identify the sampling frame of telephone numbers. The telephone numbers in the sampling frame were then stratified by county, and the sample was selected using systematic sampling. These procedures result in an approximately equal probability sample at the household level, with a proportional spread of telephone numbers across the country that is more efficient than simple random-digit-dialing sampling methods (Tucker et al., 2002).

Data were collected from January 2002 to June 2003 by 19 extensively trained interviewers using computer-assisted telephone interviewing stations. Each telephone number was called up to 20 times to screen for a working household number, determine eligibility of the household, and select an eligible respondent. For telephone numbers in which an eligible individual was selected to participate, each was called up to an additional 20 times in an effort to secure an interview with the selected respondent. Within a household with more than one eligible individual, the next-birthday method was used to select at random one individual for participation in the study (Potthoff, 1994). Of all selected eligible individuals, 57% participated in the study. Before interviews commenced, informed consent was obtained from all participants. Each participant was informed that a Certificate of Confidentiality was obtained from the U.S. National Institutes of Health to ensure the confidentiality of responses and the privacy of study participants. On average, the interview lasted 45 minutes, and participants were paid \$25 for their time.

Of the 2,829 study participants, the present analyses on workplace substance-use norms were restricted to the 2,430 workers who met two selection criteria. The first was that respondents had to be wage and salary workers. In other words, individuals who owned and operated a business were not included in the present analyses. This criterion reduced the sample from 2,829 to 2,535. The second selection criterion was that the wage and salary workers had to have at least one coworker at their work location and had to interact with other employees. Workplace social norms cannot represent a possible predictor of substance use among employees who either have no coworkers or do not interact with coworkers. This criterion reduced the sample from 2,535 to 2,430.

Respondent characteristics

The majority (55%) of the respondents were female. In terms of race/ethnicity, 77.9% were White, 11.9% were Black, 5.6% were Hispanic, and 4.7% were of other racial/ethnic makeup. The average age of participants was 39 years.

In terms of highest level of education, 0.3% did not attend high school; 3.7% attended high school but did not graduate; 22.9% graduated from high school or obtained a General Educational Development credential (or GED); 4.2% attended trade, technical, or vocational training beyond high school; 22.8% attended some college; 9.7% received an associate's degree; 20.2% received a bachelor's degree; 3.3% attended some graduate school; 10.7% received a master's degree; and 2.2% received a doctoral level degree. Average total family income was \$59,368. In terms of the 10 intermediate aggregated occupation groups based on the 1998 Standard Occupation Classification codes (U.S. Office of Management and Budget, 2000), 12.2% were in management/business/financial occupations; 26.8% were in professional occupations; 15.0% were in service occupations; 8.8% were in sales occupations; 17.8% were in office/administrative occupations; 0.5% were in farming/fishing/forestry occupations; 3.7% were in construction/extraction occupations; 4.2% were in installation/maintenance/repair occupations; 5.8% were in production occupations; and 5.4% were in transportation/material moving occupations. The participants worked, on average, 42 hours (range: 5 hours to ≥ 60 hours) per week and held their present job for an average of 5 years (range: 1 month to 37 years). In terms of work patterns, 32.4% worked weekends (Saturday or Sunday) and 4.7% held seasonal jobs.

Measures

Workplace substance-use norms. Based on the conceptual work of Ames and colleagues (Ames et al., 2000; Ames and Janes, 1992), items were developed for this study to assess workplace descriptive norms and workplace injunctive norms.

Workplace descriptive norms were assessed with six items (Frone, 2009). Respondents were asked how often during the past 12 months the coworkers they typically interact or work with each day did each of the following: (a) used alcohol before starting their work shift; (b) used marijuana or other drugs before starting their work shift; (c) used alcohol during the workday, including lunch and other breaks; (d) used marijuana or other drugs during the workday, including lunch and other breaks; (e) attended work high on or under the influence of alcohol, and (f) attended work high on or under the influence of marijuana or other drugs. The three items about alcohol were averaged to form a measure of descriptive norms regarding alcohol use at work and the three items about marijuana or other drugs were averaged to form a measure of descriptive norms regarding illicit drug use at work. The response anchors for each item ranged from (0) *never* to (5) *6 to 7 days a week*. Internal consistency reliability was .85 for alcohol descriptive norms and .93 for illicit drug use descriptive norms.

Workplace substance-use injunctive norms were assessed with eight items (Frone, 2009). Respondents were asked

the extent to which their closest friend at work approved or disapproved of (a) drinking alcohol during the workday, (b) using marijuana or other drugs during the workday, (c) coming to work high on or under the influence of alcohol, and (d) coming to work high on or under the influence of marijuana or other drugs. Respondents also were asked the extent to which their other coworkers approved or disapproved of these same four behaviors. The four items about alcohol were averaged to form a measure of injunctive norms regarding alcohol use at work and the four items about marijuana or other drugs were averaged to form a measure of injunctive norms regarding illicit drug use at work. The response anchors for each item ranged from (1) *strongly disapprove* to (4) *strongly approve*. Internal consistency reliability was .83 for alcohol injunctive norms and .89 for illicit drug use injunctive norms.

Employee substance use. Overall alcohol use was assessed with two items. One item assessed the frequency of drinking alcohol during the preceding 12 months and one item assessed the frequency of drinking to intoxication. Overall illicit drug use was assessed with separate items regarding the use of the following six drugs during the preceding 12 months: marijuana or hashish, cocaine or crack, sedatives, tranquilizers, stimulants, and analgesics. Any use of marijuana or cocaine represents illicit use. The use of the other four psychotherapeutic drugs could be licit, however. Following standard procedures in prior national surveys, respondents were told that we were interested in only nonmedical (i.e., illicit) use of sedatives, tranquilizers, stimulants, and analgesics. Nonmedical use was defined for respondents as (a) any use without a doctor's prescription or (b) any use with a prescription that was more frequent or in greater quantity than prescribed. An overall measure of the frequency of illicit drug use was obtained by selecting the maximum value for each respondent across the six drug types (Frone et al., 1994; Frone, 2008a). Examples of drugs in each of the four classes of prescribable drugs were verbally presented to respondents. Respondents were also asked how frequently they were impaired by each of the six types of drugs. An overall measure of the frequency of being impaired by an illicit drug was obtained by selecting the maximum value for each respondent across the six drug types. Each item assessing the frequency of overall alcohol and illicit drug use or impairment used a six-point frequency response scale: (0) *never*, (1) *less than monthly*, (2) *1-3 days per month*, (3) *1-2 days per week*, (4) *3-5 days per week*, and (5) *6-7 days per week*.

To assess the frequency of substance use in relation to the workday, respondents were asked how often during the past 12 months they used alcohol in each of the following three general contexts: before work (within 2 hours of starting their work shift), during the workday (during lunch breaks, other breaks, and while working), and after work (within 2 hours of leaving work). Respondents were also asked

how frequently they were impaired by alcohol during the workday. These four workplace alcohol items were used as separate outcomes in the analyses. To assess the frequency of illicit drug use in relation to the workday, participants were asked how often during the past 12 months they used each of the six drugs described earlier before work, during the workday, and after work. They were also asked how frequently they were impaired by each of the illicit drugs during the workday. Separate measures of the frequency of illicit drug use before, during, and after work and the frequency of working impaired were obtained by selecting the maximum value for each respondent across the six drug types in each context. Each item assessing the frequency of alcohol and illicit drug use in relation to the workday used a six-point frequency response scale: (0) *never*, (1) *less than monthly*, (2) *1-3 days per month*, (3) *1-2 days per week*, (4) *3-5 days per week*, and (5) *6-7 days per week*.

Covariates. Several demographic covariates were included in the analyses to control for possible spurious relations between workplace substance-use norms and employee substance use: gender (0 = *women*, 1 = *men*), race/ethnicity (0 = *White*, 1 = *minority*), age (in years), years of formal education (10 ordinal response options), total family income, number of weekly work hours, seasonal work (0 = *nonseasonal*, 1 = *seasonal*), and weekend work (0 = *do not work on Saturdays or Sundays*, 1 = *work on weekend days*). Deviance proneness was assessed to control for the tendency of individuals to (a) self-select into jobs that might have permissive substance-use norms and (b) be more likely to use alcohol and illicit drugs. The measure of deviance proneness included seven items assessing tolerance of deviance (Jessor et al., 1991) and five items assessing hostility toward rules (Hong and Faedda, 1996). The 12 items used response anchors ranging from (1) *strongly disagree* to (4) *strongly agree*. Internal consistency reliability was .78.

Data analysis

To explore the relation of workplace substance-use norms to employee substance use, ordinal logistic regression was used because each outcome had five discrete ordinal values (Long, 1997; Wooldridge, 2002). An ordinal logistic regression equation was estimated for each of the 12 employee substance-use outcomes (six for alcohol and six for illicit drugs). In each regression equation, the covariates and appropriate measures of workplace descriptive norms and workplace injunctive norms served as predictors. Although most variables had little missing data (range: 0% to 5%; $M = 1\%$) and few respondents (10%) were missing a relevant study variable, multiple imputation was used so that all eligible respondents could be represented in the analyses (McKnight et al., 2007; Royston, 2004).

Although sampling weights were developed for this study, they were not used in the present analyses. There is consen-

TABLE 1. Ordinal logistic regression results for overall substance use

Predictors	Overall frequency of alcohol use	Overall frequency of alcohol impairment	Overall frequency of illicit drug use	Overall frequency of illicit drug impairment
Gender, male	0.35***	0.37***	0.07	0.18
Race, minority	-0.61***	-0.89***	-0.13	-0.11
Age	-0.01***	-0.06***	-0.04***	-0.04***
Education	0.04*	-0.03	-0.11**	-0.12**
Total family income	0.05***	0.00	-0.04*	-0.02
Work hours per week	0.00	0.00	0.00	-0.01
Weekend work	0.02	-0.03	0.22	0.36*
Seasonal work	0.06	-0.06	0.41	0.52*
Deviance proneness	0.64***	0.88***	1.22***	1.23***
Workplace descriptive norms	0.02	-0.01	0.07	0.06
Workplace injunctive norms	0.27*	0.58***	0.92***	1.03***
Model χ^2 (11 df)	219.93***	503.33***	325.71***	308.24***

Notes: $n = 2,430$. All coefficients are unstandardized. The coefficients for income have been rescaled to represent increments of \$10,000.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

sus among statisticians and analysts that sampling weights should be used when a researcher wishes to obtain unbiased estimates of univariate population parameters (e.g., proportions, means). When used in analyses exploring bivariate and multivariate relations, however, the sampling weights may not always be appropriate. In regression analysis, sampling weights have two effects (Korn and Graubard, 1999; Winship and Radbill, 1994). First, they help to ensure that the estimated regression coefficients come closer to the population values. Second, relative to an unweighted analysis, the sampling weights lead to inefficient estimation (i.e., the standard errors in a weighted analysis are larger than those from an unweighted analysis). This can lead to the possibility of Type-2 errors. However, the impact of sampling weights on estimates of regression coefficients may be nonignorable or ignorable. In the case of nonignorable sampling weights, weighted and unweighted analyses produce different regression coefficients. The recommendation in this case is to use weighted analysis to obtain unbiased parameter estimates, even at cost of inefficiency in the estimates. In the case of ignorable sampling weights, the weighted and unweighted regression analyses produce similar regression coefficients. The recommendation in this case is to use unweighted analysis to minimize inefficiency in the estimates.

To determine if the sampling weights are ignorable, a regression analysis can be conducted (e.g., Korn and Graubard, 1999; Winship and Radbill, 1994) for each outcome variable in which all of the substantive variables and covariates are entered on Step 1. Next, the sampling weight and all two-way interactions between the sampling weight and the substantive variables and covariates are entered on Step 2. The sampling weight is ignorable if the variables entered on Step 2 do not contribute to the prediction of the outcome variable. Looking across all 12 outcomes, none of the 12 coefficients for the

sampling weight variable was significant, and only 7 of the 132 interactions were significant, which is the number expected by chance. Moreover, only one of the interactions involved a workplace norms variable. Therefore, because the sampling weights were ignorable, unweighted analyses are reported.

Results

Table 1 shows the unstandardized regression coefficients and overall model chi-square for the ordinal regression models predicting overall frequency of alcohol and illicit drug use and impairment. Workplace descriptive and injunctive norms represent alcohol use norms in the models predicting alcohol use outcomes, and represent illicit drug use norms in the models predicting illicit drug use outcomes. Tables 2 and 3 show results parallel to those for Table 1 but for the ordinal regression models predicting work-related alcohol and illicit drug use, respectively. The overall model chi-square tests in Tables 1 to 3 show that the group of predictor variables significantly predict each outcome variable. Of the covariates examined, only deviance proneness was significantly and positively related to all 12 of the outcome variables. Specifically, deviance proneness is positively related to both alcohol and illicit drug use and impairment overall and across contexts. Age was the next most consistent predictor among the covariates; it was significantly and negatively related to nine of the outcomes. Looking at overall use of alcohol and drugs, older workers, compared with younger workers, reported less frequent use of and less frequent impairment from alcohol and drugs. They also reported less frequent impairment from alcohol during the workday and less frequent use of illicit drugs before work, during the workday, and after work, as well as less frequent impairment from illicit drugs during the workday.

TABLE 2. Ordinal logistic regression results for work-related alcohol use

Predictors	Frequency of alcohol use before work	Frequency of alcohol use during the workday	Frequency of alcohol impairment during the workday	Frequency of alcohol use after work
Gender, male	0.09	0.45*	0.49	0.20*
Race, minority	-0.15	-0.08	-2.58**	-0.77***
Age	-0.02	0.00	-0.05**	0.00
Education	0.07	0.14**	-0.07	0.10***
Total family income	0.02	0.08***	0.05	0.05***
Work hours per week	-0.02	0.02	0.01	0.01
Weekend work	2.05***	-0.23	0.37	0.03
Seasonal work	-0.55	-0.62	-0.20	-0.11
Deviance proneness	1.61***	1.12***	1.32***	0.81***
Workplace descriptive norms	0.48**	0.43***	0.39*	0.13*
Workplace injunctive norms	1.05***	1.55***	1.33***	0.40***
Model χ^2 (11 df)	130.14***	287.82***	138.56***	272.35***

Notes: $n = 2,430$. All coefficients are unstandardized. The coefficients for income have been rescaled to represent increments of \$10,000.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Turning to the results for the norms variables, Table 1 shows that injunctive norms regarding workplace substance use were significantly and positively related to the frequency of overall alcohol use, overall alcohol impairment, overall illicit drug use, and overall illicit drug impairment. Descriptive norms regarding workplace substance use were not related to any of the four outcomes in Table 1. As shown in Table 2, injunctive norms regarding workplace alcohol use were significantly and positively related to the frequency of alcohol use before, during, and after work, as well as the frequency of alcohol impairment during the workday. Descriptive norms regarding workplace alcohol use were significantly and positively related to

the frequency of alcohol use before work and during the workday, the frequency of alcohol impairment during the workday, and the frequency of alcohol use after work. Similar to the outcomes for work-related alcohol use, Table 3 shows that injunctive norms regarding illicit drug use at work were significantly and positively related to each of the work-related illicit drug use outcomes. Moreover, descriptive norms regarding workplace illicit drug use were significantly and positively related to the frequency of illicit drug use before and during the workday, as well as the frequency of illicit drug impairment during the workday. Descriptive workplace illicit drug use norms did not predict illicit drug use after work.

TABLE 3. Ordinal logistic regression results for work-related illicit drug use

Predictors	Frequency of illicit drug use before work	Frequency of illicit drug use during the workday	Frequency of illicit drug impairment during the workday	Frequency of illicit drug use after work
Gender, male	0.71*	0.58	1.03**	0.16
Race, minority	0.08	0.05	0.07	-0.06
Age	-0.04*	-0.04*	-0.05**	-0.03**
Education	-0.03	-0.07	-0.09	-0.12*
Total family income	-0.10	-0.03	-0.01	-0.04
Work hours per week	-0.01	-0.01	-0.02	0.00
Weekend work	0.64	-0.01	0.29	0.10
Seasonal work	-0.08	0.28	0.19	-0.16
Deviance proneness	1.11***	1.14***	1.03***	1.29***
Workplace descriptive norms	0.29*	0.27*	0.23*	0.00
Workplace injunctive norms	1.07***	1.18***	1.28***	1.23***
Model χ^2 (11 df)	160.56***	149.05***	192.15***	196.62***

Notes: $n = 2,430$. All coefficients are unstandardized. The coefficients for income have been rescaled to represent increments of \$10,000.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Discussion

This study shows that both workplace injunctive and descriptive norms are important predictors of substance use in the U.S. workforce. There were two general patterns that were consistent across both alcohol and illicit drug use, however. The first pattern revealed that, after controlling for a number of covariates, only injunctive norms regarding workplace substance use predicted employee substance use and impairment that occurred away from work in contexts having relatively little relevance for impairment at work (i.e., overall alcohol and illicit drug use, overall impairment from alcohol and illicit drugs, and illicit drug use after work). The second pattern revealed that both injunctive norms and descriptive norms regarding workplace substance use predicted employee substance use that was relevant to employee impairment at work (i.e., alcohol and illicit drug use before work, alcohol and illicit drug use during the workday, and working under the influence of alcohol and illicit drugs). Said differently, injunctive norms regarding workplace substance use predicted all 12 outcome variables, whereas descriptive norms regarding workplace substance use primarily predicted the six outcomes representing alcohol and illicit drug use before work, alcohol and illicit drug use during the workday, and alcohol and illicit drug impairment during the workday.

One reason for the lack of relation between descriptive workplace norms and substance use and impairment away from work may have to do with the salience of different norms in different contexts. Descriptive norms, which highlight what others *do* in a given situation, can induce conformity for the sake of fitting in with a group (Cialdini and Trost, 1998). As such, they would be expected to have a strong influence on behavior in a given setting. Injunctive norms, which highlight what people *should* do in a situation, may be more internalized than descriptive norms and may thus influence behavior in a variety of contexts. Therefore, injunctive workplace norms regarding substance use at work (i.e., attitudes toward substance use at work) may become internalized and more likely to influence employee substance use both at work and away from work. In contrast, descriptive workplace norms regarding substance use at work (i.e., exposure to coworkers who use substances before and during the workday) may be more likely to influence employee substance use in these same contexts rather than other contexts (i.e., substance use at home on the weekend or before a football game). Because little research has explored the impact of descriptive and injunctive norms in a variety of contexts, or with populations other than college students, more work will be needed to verify these ideas.

As mentioned earlier, a noteworthy finding from this study is that, with the exception of a weak relation between workplace alcohol descriptive norms and alcohol use after work, the pattern of results for workplace norms was identi-

cal for both alcohol and illicit drug use. This suggests that social norms interventions designed to reduce heavy drinking (e.g., Perkins and Craig, 2006) may also be applied to reduce illicit drug use.

The present study also helps to integrate the divergent and incomparable pattern of results across the three studies described earlier. Ames et al. (2000), for example, found that descriptive and injunctive workplace alcohol norms were each positively related to drinking at work, which is consistent with the present study. They found that only descriptive workplace alcohol norms were positively related to drinking before work, however. Based on the present study, their failure to find a relation between workplace injunctive norms and drinking before work may be an artifact of sampling error. The present study suggests that both workplace descriptive and injunctive norms predict alcohol and illicit drug use before work and during the workday, as well as working while impaired by alcohol or illicit drugs. Frone (2003) found mixed results relating descriptive workplace norms to overall alcohol and marijuana use. The failure to find a significant relation between workplace descriptive norms and overall employee alcohol use is consistent with the present study. However, the significant relation Frone (2003) reported between workplace descriptive norms and overall marijuana use may have been a spurious relation because of the failure to control for workplace injunctive norms. Additional analyses from the present study support this possibility. If the regression models for overall illicit drug use and impairment presented in Table 1 are estimated without workplace injunctive norms in the model, the coefficients for workplace descriptive norms, which were small and nonsignificant, become larger and statistically significant ($b = .27, p < .001$ for overall illicit drug use, and $b = .30, p < .001$ for overall illicit drug impairment). Turning to workplace substance use, the significant relations reported by Frone (2003) between workplace descriptive norms and alcohol and marijuana use during the work day are consistent with the present study. Because workplace injunctive norms were not assessed, however, Frone (2003) failed to document the importance of this construct for overall and work-related alcohol and illicit drug use and impairment. Last, Bacharach et al. (2002) reported a positive relation between permissive coworker drinking norms and overall alcohol-related problems; however, their norms measure was a confound of descriptive norms regarding overall alcohol use and injunctive norms regarding alcohol use during lunch breaks and after work. The present results suggest that the relation between Bacharach et al.'s substance-use norms variable and overall alcohol problems may be driven, at least partly, by the items assessing workplace injunctive norms.

As with all studies, the findings from this study must be viewed within the context of its strengths and limitations. In terms of strengths, this study used a large probability sample of employed adults in the United States. Also, relative to

small samples, the large sample used in this study provides (a) adequate statistical power to detect the hypothesized effects and (b) more accurate estimates of population effects (Schmidt, 1992). In addition, this study assessed substance use in a variety of contexts, used comparable measures of social norms and outcomes for both alcohol and illicit drug use, and controlled for a number of potentially confounding variables in the analyses. These strengths allowed us to integrate the results from prior studies of workplace norms. Nonetheless, the present study has two limitations. First, the data were collected from a single source. The measures used a variety of response formats and asked questions regarding the respondents' own work outcomes and attitudes as well as their reports of the behaviors and attitudes of their coworkers, however, and these features should minimize any effect of common method bias. Second, these cross-sectional data do not lend themselves to strong causal inference. However, some longitudinal research exploring substance-use norms supports a causal effect of norms on substance use (Bullers et al., 2001; Neighbors et al., 2006).

Although a great deal is known about the impact of substance-use norms on substance use among adolescents, much less is known about the relation of social norms to employee substance use. This research suggests that workplace substance-use norms may be important predictors of employee substance use that should receive at least as much attention as that devoted to work stressors. Social norms marketing campaigns have been shown to be an effective way to reduce heavy alcohol use among college students (Perkins and Craig, 2006). Efforts to reduce work-related drinking and illicit drug use may similarly benefit from targeting social norms.

References

- Ames, G. M., Grube, J. W., & Moore, R. S. (2000). Social control and workplace drinking norms: A comparison of two organizational cultures. *Journal of Studies on Alcohol*, 61, 203-219.
- Ames, G. M., & Janes, C. J. (1992). A cultural approach to conceptualizing alcohol and the workplace. *Alcohol Health and Research World*, 16, 112-119.
- Bacharach, S. B., Bamberger, P. A., & Sonnenstuhl, W. J. (2002). Driven to drink: Managerial control, work-related risk factors, and employee problem drinking. *Academy of Management Journal*, 45, 637-658.
- Borsari, B., & Carey, K. B. (2001). Peer influences on college drinking: A review of the research. *Journal of Substance Abuse*, 13, 391-424.
- Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol*, 64, 331-341.
- Bullers, S., Cooper, M. L., & Russell, M. (2001). Social network drinking and adult alcohol involvement: A longitudinal exploration of the direction of influence. *Addictive Behaviors*, 26, 181-199.
- Cherpitel, C. J. (2007). Alcohol and injuries: A review of international emergency room studies since 1995. *Drug and Alcohol Review*, 26, 201-214.
- Cialdini, R. B., & Trost, M. R. (1998). Social influence: social norms, conformity, and compliance. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., Vol. 2, pp. 151-192). New York: McGraw-Hill.
- Elek, E., Miller-Day, M., & Hecht, M. L. (2006). Influences of personal, injunctive, and descriptive norms on early adolescent substance use. *Journal of Drug Issues*, 36, 147-172.
- Frone, M. R. (1999). Work stress and alcohol use. *Alcohol Research and Health*, 23, 284-291.
- Frone, M. R. (2003). Predictors of overall and on-the-job substance use among young workers. *Journal of Occupational Health Psychology*, 8, 39-54.
- Frone, M. R. (2006a). Prevalence and distribution of alcohol use and impairment in the workplace: A U.S. national survey. *Journal of Studies on Alcohol*, 67, 147-156.
- Frone, M. R. (2006b). Prevalence and distribution of illicit drug use in the workforce and in the workplace: Findings and implications from a U.S. national survey. *Journal of Applied Psychology*, 91, 856-869.
- Frone, M. R. (2008a). Are work stressors related to employee substance use? The importance of temporal context in assessments of alcohol and illicit drug use. *Journal of Applied Psychology*, 93, 199-206.
- Frone, M. R. (2008b). Employee alcohol and illicit drug use: Scope, causes, and organizational consequences. In J. Barling & C. L. Cooper (Eds.), *Handbook of organizational behavior: Vol. 1. Micro approaches* (pp. 519-540). Thousand Oaks, CA: Sage.
- Frone, M. R. (2009). Does a permissive workplace substance use climate affect employees who do not use alcohol and drugs at work? A U.S. national study. *Psychology of Addictive Behaviors*, 23, 386-390.
- Frone, M. R., Cooper, M. L., & Russell, M. (1994). Stressful life events, gender, and substance use: An application of tobit regression. *Psychology of Addictive Behaviors*, 8, 59-69.
- Hong, S. M., & Faedda, S. (1996). Refinement of the Hong Psychological Reactance Scale. *Educational and Psychological Measurement*, 56, 173-182.
- Jessor, R., Donovan, J. E., & Costa, F. M. (1991). *Beyond adolescence: Problem behavior and young adult development*. New York: Cambridge University Press.
- Korn, E., & Graubard, B. (1999). *Analysis of health surveys*. Hoboken, NJ: John Wiley & Sons.
- Long, J. S. (1997). *Regression models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage.
- Macdonald, S., Anglin-Bodrug, K., Mann, R. E., Erickson, P., Hathaway, A., Chipman, M., & Rylett, M. (2003). Injury risk associated with cannabis and cocaine. *Drug and Alcohol Dependence*, 72, 99-115.
- McKnight, P. E., McKnight, K. M., Sidani, S., & Figueredo, A. J. (2007). *Missing data: A gentle introduction*. New York: Guilford Press.
- Neighbors, C., Dillard, A. J., Lewis, M. A., Bergstrom, R. L., & Neil, T. A. (2006). Normative misperceptions and temporal precedence of perceived norms and drinking. *Journal of Studies on Alcohol*, 67, 290-299.
- Neighbors, C., Geisner, I. M., & Lee, C. M. (2008). Perceived marijuana norms and social expectancies among entering college student marijuana users. *Psychology of Addictive Behaviors*, 22, 433-438.
- Neighbors, C., Lee, C. M., Lewis, M. A., Fossos, N., & Larimer, M. E. (2007). Are social norms the best predictor of outcomes among heavy-drinking college students? *Journal of Studies on Alcohol and Drugs*, 68, 556-565.
- Normand, J., Lempert, R. O., & O'Brien, C. P. (1994). *Under the influence? Drugs and the American work force*. Washington, DC: National Academies Press.
- Perkins, H. W. (2002). Social norms and the prevention of alcohol misuse in collegiate contexts. *Journal of Studies on Alcohol, Supplement* 14, 164-172.
- Perkins, H. W., & Craig, D. W. (2006). A successful social norms campaign to reduce alcohol misuse among college student-athletes. *Journal of Studies on Alcohol*, 67, 880-889.
- Petratis, J., Flay, B. R., & Miller, T. Q. (1995). Reviewing theories of adolescent substance use: Organizing pieces in the puzzle. *Psychological Bulletin*, 117, 67-86.

- Potthoff, R. F. (1994). Telephone sampling in epidemiologic research: To reap the benefits, avoid the pitfalls. *American Journal of Epidemiology*, 139, 967-978.
- Rehm, J., Taylor, B., & Room, R. (2006). Global burden of disease from alcohol, illicit drugs, and tobacco. *Drug and Alcohol Review*, 25, 503-513.
- Royston, P. (2004). Multiple imputation of missing values. *Stata Journal*, 4, 227-241.
- Schmidt, F. L. (1992). What do data really mean? Research findings, meta-analysis, and cumulative knowledge in psychology. *American Psychologist*, 47, 1173-1181.
- Smart, R. G. (1980). Availability and the prevention of alcohol-related problems. In T. C. Harford, D. A. Parker, & L. Light (Eds.), *Normative approaches to the prevention of alcohol abuse and alcoholism* (DHEW Publication No. ADM 79-847, pp. 123-146), Washington, DC: Government Printing Office.
- Trice, H. M., & Sonnenstuhl, W. J. (1990). On the construction of drinking norms in work organizations. *Journal of Studies on Alcohol*, 51, 201-220.
- Tucker, C., Lepkowski, J. M., & Piekarski, L. (2002). The current efficiency of list-assisted telephone sampling designs. *Public Opinion Quarterly*, 66, 321-338.
- U.S. Office of Management and Budget (2000). *Standard occupational classification manual*. Lanham, MD: Bernan Press.
- Verkooijen, K. T., de Vries, N. K., & Nielson, G. A. (2007). Youth crowds and substance use: The impact of perceived group norm and multiple group identification. *Psychology of Addictive Behaviors*, 21, 55-61.
- Winship, C., & Radbill, L. (1994). Sampling weights and regression analysis. *Sociological Methods and Research*, 23, 230-257.
- Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.