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Perceived Physical Availability of Alcohol at Work and Workplace Alcohol Use and Impairment: Testing a Structural Model

Michael R. Frone and

State University of New York at Buffalo

Jonathan R. Trinidad

Point Loma Nazarene University

Abstract

This study develops and tests a new conceptual model of perceived physical availability of alcohol at work that provides unique insight into three dimensions of workplace physical availability of alcohol and their direct and indirect relations to workplace alcohol use and impairment. Data were obtained from a national probability sample of 2,727 U.S. workers. The results support the proposed conceptual model and provide empirical support for a positive relation of perceived physical availability of alcohol at work to workplace alcohol use and two dimensions of workplace impairment (workplace intoxication and workplace hangover). Ultimately, the findings suggest that perceived physical availability of alcohol at work is a risk factor for alcohol use and impairment during the workday, and that this relation is more complex than previously hypothesized.

The causes of alcohol misuse in the workforce have been of long-term interest to researchers, managers, and policymakers (Frone, 2013). However, prior research has focused primarily on alcohol misuse that occurs away from work. Surprisingly little research has focused on the potential causes of alcohol use and impairment during the workday despite the fact it may play a more proximal role in poor performance and dysfunctional behavior at work (Frone, 2013). An important general question, therefore, is to what extent do characteristics of the workplace represent risk factors for alcohol use and impairment during the workday?

Based on general alcohol availability theory and research (e.g., Abbey, Scott, & Smith, 1993; Her, Giesbrecht, Room, & Rehm, 1999; Livingston, Chikritzhs, & Room, 2007; Single, 1988; Smart, 1977, 1980), one potentially important cause of alcohol use and impairment during the workday is the perceived physical availability of alcohol at work. Although Ames and Janes (1992) pointed out over 20 years ago that little was known about this relation, little has changed during the intervening two decades. Therefore, the goal of this study is to (a) briefly review the definition and prevalence of perceived physical

availability of alcohol at work and (b) test a conceptual model linking perceived physical availability of alcohol at work to workplace alcohol use and impairment using a national sample of U.S. workers.

Definition and Prevalence of Perceived Physical Availability of Alcohol at Work

Ames and colleagues (Ames & Grube, 1999; Ames & Janes, 1992) provide the only explicit conceptual definition of perceived physical availability of alcohol at work. Alcohol is perceived to be physically available in the workplace to the extent that individuals report that (a) alcohol can be easily brought into work, (b) alcohol can be easily used during the workday, and (c) alcohol can be easily obtained at work. In terms of the prevalence of perceived physical availability of alcohol at work, Frone (2012) found that 50% of U.S. workers reported that alcohol can be easily brought into work, 37% reported that alcohol can be easily used while working, 50% reported that alcohol can be easily used during lunch and other breaks; and 20% reported that alcohol can be easily obtained at work.

Past Research on Workplace Physical Availability and Use of Alcohol at Work

Despite the large proportion of workers reporting that alcohol can be easily brought into, used, and obtained at work, only two studies have explored the relation between the perceived physical availability of alcohol at work and workplace alcohol use or impairment. Using a sample of 984 randomly selected employees from a single manufacturing plant, Ames and Grube (1999) failed to find a significant relation between perceived workplace physical availability of alcohol and workplace alcohol use. Likewise, using a convenience sample of 319 young (ages 16 to 19) workers, Frone (2003) failed to support a relation between perceived workplace physical availability of alcohol and workplace alcohol use.

The unexpected failure of both studies to support a positive relation between the perceived physical availability of alcohol at work and alcohol use during the workday may be due to two factors. The first factor is a lack of variability in the physical availability of alcohol at work. Ames and Grube (1999) noted that their failure to support this relation “may be due to a lack of variation.... It may be necessary to study multiple sites that differ in the extent to which alcohol is physically available in order to gain an understanding of how this factor influences drinking at work” (p. 391). Although the participants in Frone’s (2003) study represented multiple employers, the small convenience sample of young workers may have also suffer from inadequate variation in the physical availability of alcohol at work. The second factor common to both studies was the use of an overall or aggregated measure of perceived physical availability of alcohol at work. However, it may be useful to treat the three dimensions as correlated yet distinct components of the perceived physical availability of alcohol at work.

Current Study

The goal of this study is to extend prior research in two ways. First, in contrast to the homogeneous samples used in past research (Ames & Grube, 1999; Frone, 2003), the present study uses a large, national sample of U.S. workers that represents hundreds of work sites. Second, to further broaden our knowledge of the relations between the perceived physical availability of alcohol at work and both workplace alcohol use and impairment, a new conceptual model is developed. Insofar as there has been no theoretical development of the perceived physical availability of alcohol at work in terms of its three dimensions, or in terms of its relation to workplace alcohol use and impairment, the present conceptual model is built loosely from general physical availability theory of alcohol (e.g., Gorman et al., 1998; Livingston et al., 2007; Single, 1988; Smart, 1980), as well as a more general models of employee alcohol use and impairment (e.g., Frone, 2013). The hypothesized model is depicted in Figure 1.

As illustrated in Figure 1, the model maintains the three dimensions of perceive workplace physical availability of alcohol as separate constructs that are related to one another. Ease of bringing alcohol into work represents a structural feature of the workplace that is hypothesized to be directly and positively predictive of ease of obtaining alcohol at work (Hypothesis 1), as well as ease of using alcohol during the workday (Hypothesis 2). In most jobs, an employee cannot obtain alcohol at work if it cannot be brought into the workplace, and use during the workday is facilitated by being able to bring alcohol into work. Using similar logic, it is hypothesized that ease of obtaining alcohol at work is directly and positively related to ease of using alcohol during the workday (Hypothesis 3). The ability to use alcohol in a setting is facilitated by being able to obtain alcohol from others in that setting. Both ease of obtaining alcohol during the workday (Hypothesis 4) and ease of using alcohol at work (Hypothesis 5) are hypothesized to be directly and positively related to workplace alcohol use. Further, ease of bringing alcohol into work is hypothesized to be indirectly and positively related to workplace alcohol use via ease of obtaining alcohol at work and ease of obtaining alcohol during the workday (Hypothesis 6). In addition to its direct effect, ease of using alcohol at work is hypothesized to be indirectly and positively related to workplace alcohol use via ease of using alcohol during the workday (Hypothesis 7). In turn, it is hypothesized that workplace alcohol use is the proximal direct cause of workplace alcohol intoxication (Hypothesis 8) and workplace alcohol hangover (Hypothesis 9). Finally, it is hypothesized that all three dimensions of workplace physical availability of alcohol are indirectly and positively related to workplace alcohol intoxication and workplace hangover via workplace alcohol use (Hypothesis 10).

Methods

Sample, Study Design, and Sampling Weights

The 2,829 study participants took part in a telephone survey entitled the National Survey of Workplace Health and Safety. 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. Nineteen extensively trained interviewers collected data from January

2002 to June 2003. Of all selected eligible individuals, 57% participated in the study. For all analyses, the participants were weighted to generalize to the target population defined earlier (e.g., Korn & Graubard, 1999; Levy & Lemeshow, 1999). For more detail on the study design and sampling weights, see Frone (2006a). Of the 2,829 study participants, the present analyses were restricted to the 2,727 workers who had complete data on all study variables. Therefore, only 3.6% of the overall sample was lost due to missing data on at least one variable; and most variables had little missing data ($M = 0.8\%$, range = 0% to 2.6%).

Respondent Characteristics

The respondent (i.e., population) characteristics are described with weighted means and percentages. Slightly more than half of the respondents were male (53.0%). In terms of race/ethnicity, 72.4% were White; 12.5% were Black; 8.2% were Hispanic; and 6.9% were of other racial/ethnic makeup. The average age of participants was 39.2 years. The participants worked an average of 42.0 hours per week and held their present job for an average of 5.1 years. In terms of work patterns, 34.1% worked, at least partly, on weekend days (Saturday or Sunday) and 5.6% held seasonal jobs. For more information on the sample characteristics, see Frone (2006a, 2006b).

Measures

Workplace physical availability of alcohol—To assess the perceived physical availability of alcohol at work, items were developed based on the conceptual definition of Ames and colleagues (Ames & Janes, 1992; Ames & Grube, 1999). Respondents were asked (1) If you were to try, how easy or difficult would it be for you to bring alcohol into work?; (2) If you were to try, how easy or difficult would it be for you to have a drink of alcohol while working?; (3) If you were to try, how easy or difficult would it be for you to have a drink of alcohol during lunch or other work breaks?; and (4) If you were to try, how easy or difficult would it be for you to get or buy alcohol from someone at work? Items 1 and 4 represent the ease of bringing alcohol into work and the ease of obtaining alcohol at work, respectively. Items 2 and 3 were combined into a measure of ease of using alcohol during the workday by taking the maximum value across the two items (e.g., Frone, 2008; Frone, Cooper, & Russell, 1994). The response anchors ranged from (1) very difficult to (4) very easy.

Workplace alcohol use and impairment—Frequency of alcohol use during the workday was assessed with three items. Respondents were asked how often during the past 12 months they had consumed alcohol during lunch breaks, during other breaks, and while working. An overall measure of workplace alcohol use was created by selecting the maximum value for each respondent across the three items (e.g., Frone, 2008; Frone, Cooper, & Russell, 1994). Workplace intoxication was assessed by asking participants how often during the past 12 months they had been at work high on or under the influence of alcohol. Workplace hangover was assessed by asking participants and how often they had been at work with a hangover. The response anchors for each item ranged from (0) never to (5) 6–7 days per week.

Covariates—Several covariates were used to control for possible spurious relations among the constructs in Figure 1 due to the possibility that certain individuals may (a) self-select into jobs with higher levels of workplace physical availability of alcohol and (b) be more likely to use alcohol during the workday. The demographic covariates were gender (0 = women, 1 = men), age (in years), and years of formal education (10 ordinal response options). The analyses also controlled for behavioral disinhibition and the tendency to drink heavily outside work and drink before going to work. The measure of behavioral disinhibition included seven items assessing tolerance of deviance (Jessor, Donovan, & Costa, 1991) and five items assessing hostility toward rules (Hong & Faedda, 1996). The response anchors ranged from (1) strongly disagree to (4) strongly agree. Internal consistency reliability was .78. Overall frequency of drinking to intoxication was assessed by asking participants how often during the past 12 months they drank enough to become intoxicated or drunk. Overall frequency of hangover was assessed by asking participants how often during the past 12 months they drank enough to experience a hangover after they stopped drinking or the next day. Drinking before work was assessed by asking participants how often during the past 12 months they used alcohol in the two hours before work. The response anchors for the alcohol items ranged from (0) never to (5) 6–7 days per week.

Data Analysis

The correlations and path analysis employed sampling weights (e.g., Asparouhov, 2005; Lehtonen & Pahkinen, 2004; Muthén & Muthén, 2012). The path model shown in Figure 1 was estimated using Mplus software. In addition to allowing the use of sampling weights, the mix of continuous and ordinal variables were taken into account using a robust weighted least squares estimator (Asparouhov, 2005; Muthén & Muthén, 2012). Because the sampling distribution of indirect effects (i.e., a product of two coefficients) is nonnormal, the significance of all indirect effects was based on bootstrapped standard errors using 5,000 bootstrap samples (e.g., Edwards & Lambert, 2007; Preacher, Rucker, & Hayes, 2007). Bootstrapping also was used to obtain the standard errors for each of the reported direct effects in the model. Model fit was assessed with the χ^2 statistic, the comparative fit index (CFI), Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA). Based on recommendations by Hu and Bentler (1989), the following cut-offs were used to indicate adequate model fit: CFI and TLI > .95 and RMSEA < .06. Although not shown in the figures, the five covariates were treated as correlated exogenous variables and each covariate predicted each of the six endogenous variables representing the perceived physical availability of alcohol at work, workplace alcohol use, and workplace alcohol intoxication and hangover.

Results

Descriptive statistics and correlations among the variables are reported in Table 1. The hypothesized model showed an excellent fit to the data: χ^2 ($df = 7$; $N = 2,727$) = 9.59, $p = .21$; CFI = 1.00; TLI = 1.00; and RMSEA = .01 (90% CI = .00, .03). Table 2 provides the path coefficients relating the covariates to each of the endogenous variables comprising the hypothesized model. Figure 2 presents the path coefficients for the substantive portion of the model. Finally, Table 3 presents estimates of the total effects, direct effects, and total

indirect effects. Before discussing the specific hypotheses, it is useful to point out that the results in Table 3 show that, after adjusting for the covariates, each of the three dimensions of perceived physical availability of alcohol at work had a significant and positive overall relation (total effect) to workplace alcohol use, workplace alcohol intoxication, and workplace hangover.

Supporting Hypotheses 1 and 2, respectively, Figure 2 shows that ease of bringing alcohol into work was positively related to both ease of obtaining alcohol at work and ease of using alcohol during the workday. Supporting Hypothesis 3, Figure 2 shows that ease of obtaining alcohol at work was positively related to ease of using alcohol at work. Supporting Hypotheses 4 and 5, respectively, Figure 2 shows that both ease of obtaining alcohol at work and ease of using alcohol at work were positively related to workplace alcohol use. Supporting Hypothesis 6, Table 3 shows that the overall indirect relation of ease of bringing alcohol into work to workplace alcohol use via both ease of using alcohol at work and ease of obtaining alcohol at work was significant and positive. Table 3 also shows that ease of obtaining alcohol at work was indirectly and positively related to workplace alcohol use via ease of using alcohol during the workday, supporting Hypothesis 7. Figure 2 shows that workplace alcohol use was directly and positively related to workplace alcohol intoxication, supporting Hypothesis 8, and to workplace hangover, supporting Hypothesis 9. Finally, supporting Hypothesis 10, Table 3 shows that all three dimensions of workplace physical availability of alcohol were indirectly and positively related to workplace alcohol intoxication and workplace alcohol hangover via workplace alcohol use.

Discussion

Alcohol use among employees is a potentially important cause of health problems, dysfunctional behavior, and performance deficits. However, in terms of dysfunctional behaviors and performance deficits at work, alcohol use and impairment that occurs during the workday is of primary concern (Frone, 2013). However, relatively little research has explored the etiology of workplace alcohol use and impairment. The present study contributes to this developing literature in two ways. First, this study extended prior research on perceived workplace physical availability of alcohol and workplace alcohol use by using a broad, national sample of U.S. workers. The only two prior studies to explore this relation failed to provide support for it (Ames & Grube, 1999; Frone, 2003). However, there was reason to suspect that these two studies may not have had adequate variation in the measure of perceived physical availability of alcohol at work. The present study's heterogeneous sample provides support for the general expectation that perceived physical availability of alcohol at work is positively related to both alcohol use and alcohol impairment during the workday.

Second, this study extended prior research by developing a conceptual model that disaggregated the three dimensions of perceived workplace physical availability of alcohol at work and allowed them to relate to each other and alcohol use and impairment. This model provides a number of unique insights into the potential process linking these variables. For example, although all three dimensions of perceived workplace physical availability of alcohol were positively related to workplace alcohol use, only ease of using

alcohol during the workday and ease of obtaining alcohol at work were directly related to workplace alcohol use. The ease of bringing alcohol into work was indirectly related to workplace alcohol use via ease of obtaining alcohol and ease of using alcohol during the workday. Further, workplace alcohol use is the proximal predictor of the two dimensions of workplace alcohol impairment, which means that all three dimensions of workplace physical availability of alcohol are indirectly related to higher levels of workplace alcohol impairment via higher levels of workplace alcohol use. Given the paucity of conceptual development regarding perceived availability of alcohol at work, a goal of the present study is to motivate further research and conceptual development regarding this aspect of the etiology of alcohol use and impairment at work.

These results should be interpreted within the context of the strengths and limitations of the present study. In terms of strengths, this study used a large heterogeneous probability sample of employed adults in the U.S that provided adequate variation in the constructs comprising the model. Also, the large sample used in this study provides adequate statistical power to detect the hypothesized relations and more accurate estimated population parameters (e.g., Schmidt, 1992). Finally, to account for possible spurious relations due to self-selection effects, the model was estimated while controlling for several individual characteristics including gender, age, education, behavioral disinhibition, and a predisposition to drink heavily and before work.

These strengths notwithstanding, the present study has two limitations. First, the data were collected from a single source. Nonetheless, the measures of workplace physical availability of alcohol and workplace alcohol use and impairment used different response formats, which should minimize common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Also, the model variables represent relatively objective workplace features (workplace physical availability of alcohol) and objective behaviors at work (workplace alcohol use and impairment). Second, the cross-sectional data do not lend themselves to strong inferences regarding the direction of causal effects because they cannot rule out reverse or reciprocal relations.

In terms of future research and practical application, the present results support future longitudinal research in order to strengthen causal claims regarding the relations in the new conceptual model. Also, research should explore the organizational characteristics and policies that may minimize the physical availability of alcohol at work. Research on and management attention toward reducing workplace physical availability of alcohol may have broader organizational relevance than merely improving workplace performance of those employees who engage in workplace alcohol use. Reductions in workplace physical availability of alcohol may also increase perceived workplace safety, work-related health, and work morale among the majority of employees who do not use alcohol at work (Frone, 2009).

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Figure 1.

Hypothesized conceptual model of workplace physical availability of alcohol and workplace alcohol use and impairment.

Figure 2.

Path analytic results for the conceptual model. *Note:* For each path the following coefficients are stacked: unstandardized path coefficient; standard error for the unstandardized path coefficient; standardized path coefficient. For the relation between workplace intoxication and workplace hangover, the correlation between the disturbance terms is presented. The concurrently estimated relations involving the covariates are shown in Table 2.

** $p < .01$, *** $p < .001$

Table 1

Descriptive statistics and correlations (weighted).

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Ease of bringing alcohol into work	2.53	1.30	--												
2. Ease of obtaining alcohol at work	1.72	1.10	.36	--											
3. Ease of using alcohol during the workday	2.62	1.26	.68	.42	--										
4. Workplace alcohol use	0.11	0.46	.13	.20	.18	--									
5. Workplace alcohol intoxication	0.03	0.28	.03	.11	.05	.29	--								
6. Workplace alcohol hangover	0.12	0.41	.05	.11	.09	.18	.11	--							
7. Gender (male)	0.53	0.50	.10	.08	.13	.09	.06	.08	--						
8. Age	39.16	11.83	.11	-.12	.03	-.01	-.10	-.18	.00	--					
9. Education	5.47	2.15	.09	-.04	.06	.06	-.04	-.02	.01	.13	--				
10. Behavioral disinhibition	1.37	0.38	.11	.13	.17	.19	.11	.21	.14	-.18	.16	--			
11. Overall frequency of intoxication	0.46	0.82	.01	.14	.08	.21	.16	.54	.11	-.32	-.07	.22	--		
12. Overall frequency of hangover	0.30	0.61	-.01	.12	.07	.21	.17	.58	.08	-.27	-.01	.25	.70	--	
13. Alcohol use before work	0.03	0.21	.05	.11	.06	.34	.48	.09	.04	-.04	-.01	.14	.11	.11	--

Note: $N=2,727$. Correlations with absolute values of .05 or higher are significant at $p < .05$.

Table 2

Path coefficients relating covariates to the model variables (weighted).

Covariates	Model Variables					
	Ease of bringing alcohol into work	Ease of using alcohol during the workday	Ease of obtaining alcohol at work	Workplace alcohol use	Workplace alcohol intoxication	Workplace alcohol hangover
1. Gender (male)	.18*** [.04] .09	.12* [.06] .03	.08 [.05] .03	.17 [.09] .07	.09 [.18] .04	.05 [.09] .02
2. Age	.01*** [.002] .14	.00 [.003] .01	-.02*** [.002] -.16	.01** [.004] .13	-.03** [.01] -.24	-.01 [.004] -.06
3. Education	.03** [.01] .07	-.01 [.01] -.01	-.04*** [.01] -.08	.07*** [.02] .13	-.07 [.04] -.12	-.01 [.02] -.01
4. Behavioral disinhibition	.34*** [.07] .13	.25*** [.08] .06	.13 [.07] .04	.37*** [.10] .12	.12 [.16] .04	.22 [.12] .06
5. Overall frequency of intoxication	.07 [.04] .06	.02 [.05] .01	.04 [.05] .03	.19** [.07] .13	.01 [.13] .01	.44*** [.06] .28
6. Overall frequency of hangover	-.08 [.05] -.06	.07 [.07] .02	.11 [.06] .06	.21* [.09] .11	.18 [.15] .09	.70*** [.08] .33
7. Alcohol use before work	.18* [.09] .04	-.01 [.13] .00	.38** [.13] .06	.76*** [.12] .13	.83*** [.18] .13	-.07 [.24] -.01

Note. $N = 2,727$. For each covariate in each column the following coefficients are stacked: unstandardized path coefficient; standard error for the unstandardized path coefficient; standardized path coefficient. All 42 relations involving the covariates and model variables presented in this table and the 8 relations shown in Figure 2 were estimated concurrently.

* $p < .05$,

** $p < .01$,

*** $p < .001$

Table 3

Total, direct, and indirect effects (weighted).

Predictor	Ease of obtaining alcohol at work	Ease of using alcohol at work	Workplace alcohol use	Workplace alcohol intoxication	Workplace alcohol hangover
Ease of bringing alcohol into work					
Total effect	.62*** [.03] .52	1.34*** [.05] .78	.32*** [.04] .28	.16*** [.04] .14	.06** [.02] .04
Direct effect	.62** [.03] .52	1.13*** [.05] .66	0 ^a	0 ^a	0 ^a
Total indirect effect	NA	.21*** [.02] .12	.32*** [.04] .28	.16*** [.04] .14	.06** [.02] .04
Ease of obtaining alcohol at work					
Total effect		.34*** [.04] .24	.21*** [.05] .22	.10*** [.03] .10	.04** [.01] .03
Direct effect		.34*** [.04] .24	.15*** [.06] .15	0 ^a	0 ^a
Total indirect effect		NA	.06*** [.01] .06	.10*** [.03] .10	.04** [.01] .03
Ease of using alcohol at work					
Total effect			.17*** [.04] .25	.09*** [.03] .12	.03*** [.01] .04
Direct effect			.17*** [.04] .25	0 ^a	0 ^a
Total indirect effect			NA	.09*** [.03] .12	.03*** [.01] .04
Workplace alcohol use					
Total effect				.50*** [.11] .47	.17** [.06] .16
Direct effect				.50*** [.11] .47	.17** [.06] .16
Total Indirect effect				NA	NA

Note: N = 2,727. For each total effect, direct effect, and total indirect effect, the following coefficients are stacked: unstandardized path coefficient; standard error for the unstandardized path coefficient; standardized path coefficient. NA= Not applicable.

^aDirect effects constrained to equal zero.

**
p < .01,

p < .001