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Residence Hall Room Type and Alcohol Use Among College Students Living on Campus

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The objectives were to explore the relation between the built environment of residence halls and the alcohol use of college students living on campus from the perspective of the theory of routine activity. This exploratory study examined data from two samples on one college campus. Online surveys assessed alcohol use, attitudes toward alcohol use, perceptions of campus alcohol norms, and individual factors (i.e., gender). Data came from an Alcohol Norms Survey using a random sample (N = 440) and a Resident Assessment Survey using a random sample (N = 531) in 2006 and 2007. After controlling for other drinking behavior predictors (attitudes, gender, high school drinking, and perceptions of peer drinking), regression analysis showed that students living in suite halls had a higher odds of drinking more frequently, drinking more alcohol when they socialize, heavy episodic drinking, and drinking more often in their residence halls.

Keywords: *alcohol use; college students; built environment; risk factors*

Alcohol consumption among adolescents and college students between 18 and 24 years old has emerged as a serious public health issue. In 2007, the United State's Surgeon General called for action to reduce underage drinking because alcohol is the most widely used substance among America's youth. Alcohol use can have diverse short-term and long-lasting negative affects on health and brain development. The highest prevalence

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of alcohol dependence is among people in the age group of 18 to 20 years (U.S. Department of Health and Human Services, 2007), and alcohol misuse among college students causes 1,700 deaths and more than half a million injuries annually (Hingson, Heeren, Winter, & Wechsler, 2005).

To develop interventions to reduce heavy episodic drinking among college students, researchers are exploring diverse social, cognitive, and environmental factors contributing to alcohol consumption and heavy episodic drinking. Despite their importance, environmental factors have been studied less than social and individual factors related to substance use (Gifford & Hine, 1990-1991; Scribner et al., 2008). When they are investigated, researchers tend to focus on macroenvironmental factors, such as decreasing access to alcohol (e.g., prohibiting sales on campus) and reducing density of alcohol establishments near campus or restricting business hours (Toomey, Lenk, & Wagenaar, 2007). Although these macroenvironmental factors are extremely important, microfactors related to the campus built environment and especially residence halls may be important in college student alcohol use; unfortunately they have received little attention in the literature. Toomey et al. (2007) identified 110 studies between 1999 and 2006 addressing environmental factors. Of these, only 36 focused on college populations and none focused on the built environment of residence halls. Toomey et al. concluded that further research is needed to understand environmental strategies to reduce drinking. Therefore, the current study focuses on built environment factors of residence halls that influence alcohol use among college students.

Living Arrangements and Alcohol Use

College students' living arrangements have been deemed important in college alcohol use. For example, students living in fraternity or sorority houses consume alcohol more frequently and drink more than other students (Capone, Wood, Borsari, & Laird, 2007; Page & O'Hegarty, 2006; Wechsler, Kuo, Lee, & Dowdall, 2000). Also, rates of drinking among students living in residence halls tend to be much higher than among students who live off-campus or with family (O'Hare, 1990). Furthermore, students living in coed halls incurred more problems with alcohol than did students living in single-gender halls (Harford, Wechsler, & Muthen, 2002).

The Role of the Residence Hall Built Environment

Researchers have often lumped students living on campus as a homogenous group without exploring the potential effects of different on-campus

living arrangements, however, colleges and universities provide a wide range of residence hall designs. Many residence halls are designed around a single room that serves as both a bedroom and study space. Although names for room types differ by campus, general variations depend on (a) occupancy, (b) room type, and (c) living space. Related to occupancy, some halls have one student per room (single), whereas others have two (doubles) to four students (quads). Furthermore, halls are designed around room types with different bathroom locations. *Standard* rooms have a sleeping/study area with a community bathroom on the floor, *private* rooms have a private bathroom in addition to the sleeping/study area, whereas s*uites* have two rooms connected through an adjoining semiprivate bathroom. Finally, *deluxe* rooms feature extra shared living space (i.e., study room) separate from the bedrooms. On any campus, residence halls may have mixed designs of occupancy, room type, and living space.

Gifford and Hine (1990-1991) suggest that the most popular setting for alcohol consumption is a person's residence. In addition, they suggest that the smallest level of analysis should be the architectural or building and room features (e.g., room size). Related to the built environment, one study suggested that Residence Assistants (RAs) teach residents on their floors to break drinking rules depending on visibility (Rubington, 1990). In residence halls with high visibility (i.e., more open halls and room access vs. more closed hallways), RAs took a more active role in teaching responsible drinking. In addition, an exploratory study found that greater alcohol consumption was associated with more students per room and that alcohol consumption was highest in halls with the most students living in them (Shick-Tryon, 1985). However, this study did not report a direct comparison of different room designs related to alcohol consumption.

In an examination of social factors, Harford et al. (2002) found that students living in coed residence halls drank more than peers in single-gender halls. However, studies typically have not examined the relation between the built environment (hall design and room type) and social factors (coed halls/floors). Both density and gender are likely to be associated with hall design and room type. Standard halls are typically single gender because of community bathrooms on each floor, whereas suite and private halls can more easily accommodate both genders in the same hall or on the same floor. Smaller halls are more likely to be single gender. Larger halls can more easily accommodate both genders by assigning men to one floor and women to another.

A closer look at residence hall design in investigations of college drinking is warranted. Therefore, our study examines the microlevel environmental effects of the residence hall design on alcohol consumption, in

contrast to most research that has focused on macroenvironmental effects (e.g., community features and policies) or social and individual predictors. Residence hall design sets the stage for different social interactions and drinking behaviors among students and deserves to be examined as a potential risk factor for alcohol use.

The Routine Activities Theory as an Organizing Framework

The routine activities theory may be particularly helpful in explaining the influence of the residence hall environment on college student alcohol use. The theory was originally designed to explain predatory crimes (Cohen & Felson, 1979); it has subsequently been extended to individual behaviors such as alcohol use (Gilbertson, 2006; Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996). The routine activities theory posits that three factors come together to explain harmful situations: a motivated offender, a suitable target, and the absence of a capable guardian (Cohen & Felson, 1979).

When interpreted in terms of college alcohol use, motivated offenders would be college students, a suitable target would be opportunities to engage in alcohol consumption, and a capable guardian would be an RA or peer whose role is to deter alcohol use in residence halls (Osgood et al., 1996). A common routine activity among young adults living in residence halls is unstructured socializing with friends; very often there is no authority figure closely supervising. Such situations have been related to an increase in unhealthy behaviors such as alcohol use (Osgood et al., 1996). Gilbertson (2006) states, "the presence of motivated offenders and suitable targets is assumed in any situation where heavy drinking occurs among college students" (p. 75). Furthermore, Osgood et al. (1996) found that in the presence of peers, a behavior such as alcohol use is both possible and rewarding. It has also been found that a situation is more conducive to negative behaviors, such as alcohol use, if no authority figure is present (Osgood et al., 1996). Although, Gilbertson (2006) found that students can function as capable guardians, residence hall designs may affect the ability for guardians, such as RAs whose role is to deter alcohol use, to fulfill this role. Finally, architectural and environmental designs serve to increase target suitability and decrease guardianship (Cohen & Felson, 1979).

The Current Study

Our objective was to begin a series of exploratory studies looking more closely at the potential effect of the residence hall environment on drinking

behaviors among students residing on campus using the framework of the theory of routine activity. Specifically, we explored the influence of living in suite halls compared with standard halls because such college residence hall designs are common across the United States (Clemons, Banning, & McKelfresh, 2004). We examine whether hall design (community bathroom vs. semiprivate bathroom) influences drinking behaviors because of the differences in space and privacy. We were not only interested in how frequently students drank, but also how much they drank, heavy episodic drinking, residence hall drinking patterns, and the perceived impact of alcohol on quality of life.

We posed the following research question: Is room type (*suite* vs. *standard*) related to drinking frequency (general and in residence halls), number of drinks consumed when socializing, and heavy episodic drinking? According to the theory of routine activity, space may influence the situational motivation for alcohol consumption and privacy would hamper the ability for capable guardians (e.g., RAs or other peers) to deter drinking. Based on this theory, we hypothesize that: (a) students living in suite style halls will be more likely to consume more drinks when they consume alcohol, (b) students living in suites will be more likely to drink alcohol more frequently, and (c) students living in suites will be more likely to engage in heavy episodic drinking.

Method

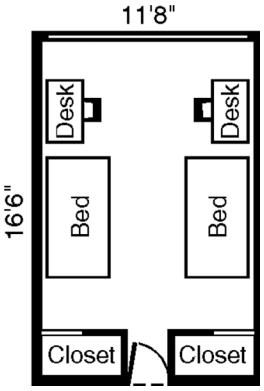
Research Setting

The research setting is a 24,000-student public university located in the Rocky Mountain region. Ten residence halls have a total capacity of 5,000 students. Each year about 4,200 of the 4,400 entering freshmen live on campus and the others live off-campus. University policy requires all newly admitted first-year students under age 21, without previous college experience, to live in a campus residence hall for two consecutive terms or live with their family if they are from the local area.

Room Types

The 10 residence halls have different physical configurations and are designed with one of two room types, standard or suite. Seven of the halls have standard rooms with a community bathroom on the floor (Figure 1)

Figure 1
Standard Room Floor Plan

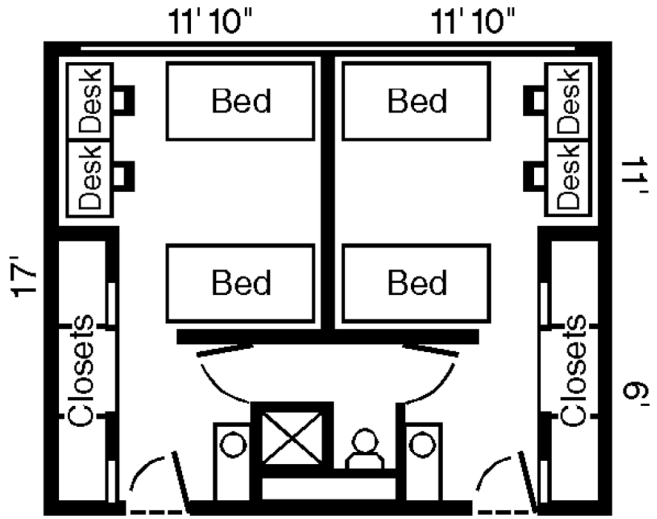


with two students sharing each room. The other three halls have suites that contain semiprivate bathrooms that are shared by two adjoining rooms (Figure 2). Most of the suite halls have double rooms on each side, but in one of the halls some of the suites have a double room adjoining a single room. Most halls house about 450 students, with one of the suite halls housing about 900 students. Overall, about 50% of the rooms on campus are standard rooms and 50% are suites.

Participants and Procedure

This exploratory study analyzed data from two surveys with separate samples of college students at a single university. The surveys were administered during the 2006-2007 and 2007-2008 academic years. See Table 1 for a summary of the demographic characteristics of both studies. The first survey, the Alcohol Norms Survey, was administered in the fall of 2006. Participants were recruited from a random sample of 1,270 students drawn from three preselected halls (approximately equal samples from each hall). Two of those halls were Suites and the other had Standard rooms. The sampled students received e-mails and letters inviting them to participate in a study. About 440 residence hall students responded to the Web-based survey (35% response rate). They were entered into a raffle as compensation for participating.

Figure 2
Suite Room Floor Plan



The second survey used data from the Resident Assessment Survey administered by Educational Benchmarking Inc. (EBI). A random sample (n = 1,000) was drawn from all students living in campus residence halls. This survey was administered twice, once in fall 2006 and once in fall 2007. Students received an e-mail inviting them to take part in the survey and were not offered any incentive for their participation. In 2006, 251 residence hall students responded (25%) and in 2007, 280 students responded (28.5%). We combined the surveys from both samples for analysis. While these response rates are lower than the rate from the Alcohol Norms Survey, survey response rates have been declining in recent decades (Keeter, Miller, Kohut, Groves, & Presser, 2000), and Web surveys are likely to have lower response rates than other survey modes (Manfreda, Bosniak, Berzelak, Haas, & Vehovar, 2008). Low-response rates alone are not likely to predict nonresponse bias, especially when the variable of interest (alcohol use) is not the primary topic of the survey (residence hall satisfaction) as described to potential participants in the request to participate (Groves, 2006; Groves & Peytcheva, 2008).

Table 1
Demographic Characteristics of Students

Variable	Alcohol Norms Survey Percentage	Alcohol Norms Survey $N = 440$	Educational Benchmarking Inc. Resident Assessment Percentage	Educational Benchmarking Inc. Resident Assessment $N = 531$
Gender				
Male	28.0	123	29.4	156
Female	72.0	317	70.2	372
Race/ethnicity				
White	84.5	372	85.6	453
Hispanic	4.1	18	6.0	32
Other non-White	11.4	50	8.3	43
Age (years)				
≤17	1.4	6	—	—
18	65.1	287	—	—
19	26.3	116	—	—
20	3.2	17	—	—
≥21	4.1	18	—	—
Class standing				
Freshman	88.4	389	82.9	440
Sophomore	6.6	29	11.7	62
Junior	1.6	7	3.6	19
Senior	3.4	15	1.7	9
Room type				
Suite	65.8	289	50.3	267
Standard	34.2	150	49.7	264

	Mean (*SD*)	Median	Mode	Range	*n*	Mean (*SD*)	Median	Mode	Range	*n*
Number of alcoholic drinks consumed	3.92 (2.8)	4	1	9	507	2.29 (1.45)	2	1	4	425
Frequency of consuming alcohol	2.82 (1.52)	3	1	5	507	2.04 (1.08)	2	1	4	424
Consumed drinks five or more in a 3- to 5-hour period in last 30 days	1.83 (1.20)	1	1	6	510	—	—	—	—	—
Frequency of drinking in my hall	1.16 (1.14)	1	1	4	491	—	—	—	—	—
Alcohol negatively affects quality of life on my floor	—	—	—	—	—	2.45 (1.59)	1	1	6	398

Alcohol Norms Survey Measures

The Alcohol Norms Survey is a Web-based survey that includes questions regarding alcohol use and consequences, attitudes towards alcohol use, and perceptions of alcohol norms on campus. Questions for the survey were adapted from established assessments that have been used on campus in recent years, such as the National College Health Assessment (American College Health Association, 2007) and the Core Institute's Campus Survey of Alcohol and Other Drug Norms.

Residence room type. Participants were asked which of the three sampled residence halls they lived in. These were recoded based on hall design (1 = *Suite*, 0 = *Standard*) for data analysis.

Alcohol use. To measure the typical amount of alcohol consumed, participants were asked "When you go out and socialize or party and drink alcohol, how much do you typically consume per event?" Response choices ranged from 1 to 10 in which 1 = *I do not consume*, 3 = *2 drinks*, 5 = *4 drinks*, 7 = *6 drinks*, 9 = *8 drinks*, and 10 = *more than 8 drinks*. Heavy episodic drinking was measured by "During the last 30 days, on how many days did you have 5 or more drinks with alcohol in a 3- to 5-hour period" (1 = *none*, 4 = *6-9 days*, 7 = *all 30 days*).

Two questions measured frequency of alcohol use. First, participants were asked how frequently they typically consumed alcohol, with six response choices, 1 = *I do not consume*, 2 = *less than once per month*, 3 = *a few times a month*, 4 = *once per week*, 5 = *2-3 times per week*, and 6 = *almost every day or every day*. We used this measure as a dependent variable when examining the influence of room type on alcohol use, and then we used it as a predictor when examining the next variable, frequency of alcohol use in the residence hall. When used in the model to predict frequency of use in the residence hall, we collapsed this measure into two categories—infrequent and frequent drinkers. The values 1 (*never*) and 2 (*less than once per month*) were recoded to 0 (*infrequent drinker*) and the values 3 to 5 (*a few times per month, once per week and several times per week*) were recoded to 1 to reflect the label *frequent drinker*. Second, to investigate drinking specifically within the residence hall, participants were asked "If you drink alcohol, how often do you typically consume it in another room in your residence hall?" (1 = *do not drink*, 5 = *more than once per week*).

Individual factors. To include important individual factors in the analyses, students' attitudes, high school alcohol use, and perceptions of their friend's alcohol use were measured. Attitudes were measured with: "What attitude best represents you", and response choices were 1 = *drinking is never a good thing to do*, 2 = *drinking is ok, but a person should never get drunk*, 3 = *occasionally getting drunk is ok, as long as it doesn't interfere with academics or other responsibilities*, 4 = *occasionally getting drunk is ok, even if it interferes with academics and other responsibilities*, 5 = *frequently getting drunk is ok, if that is what a person wants to do*. For high school use, participants were asked, "During your last year in high school, how many times did you use alcohol in a typical month?" and response choices ranged from 1 to 6 in which 1 = *none*, 2 = *1-2 times*, 3 = *3-9 times*, 4 = *10-19 times*, 5 = *20-29 times*, and 6 = *30 or more times*. Finally, perceptions of friend use were measured with, "How often do you think your friends typically do the following: consume alcohol?" and were given the following response choices: 1 = *do not consume*, 2 = *less than once per month*, 3 = *a few times a month*, 4 = *once per week*, 5 = *2 -3 times per week*, and 6 = *almost every day or every day*.

EBI Resident Assessment Measures

Survey 2, based on an EBI Survey, was administered by the university's Division of Student Affairs who allowed us access to the data. The larger survey consisted of questions about residence hall and student life as well as satisfaction with residence halls along with three questions of interest to our study.

Residence hall and floor type. Participants were asked whether they lived on a coed floor or a single-sex floor (0 = *male only*, 1 = *female only*, and 2 = *coed*). In addition, they were asked which hall they lived in, and these were recoded based on hall design for data analysis (1 = *suite*, 0 = *standard*).

Alcohol use. Similar to the Alcohol Norms Survey, participants were asked about the frequency of alcohol consumption (1 = *I do not consume*; 6 = *every day*) and the number of alcoholic drinks consumed per event (1 = *I do not consume alcohol*; 6 = *more than 8 drinks*).

Perceived influence of alcohol on quality of life. To investigate perceptions of the impact of alcohol use in the residence hall on quality of life,

participants were asked how negative the impact of alcohol use was on quality of life (1 = *not at all*; 7 = *extremely*).

Statistical Analysis

When analyzing the data from the Alcohol Norms Survey, ordinary least squares regression was used to examine the relation between room type and number of drinks typically consumed, controlling for other known predictors of alcohol use. The other dependent variables, frequency of alcohol consumption, frequency of consumption in the residence halls, and the items from the EBI data set are ordinal measures; therefore, ordinal logistic regression was used to examine the relation between room type and these dependent variables (Menard, 2002).

Results

Sample Characteristics

See Table 1 for the demographic characteristics of both samples. As expected, the characteristics of the two samples are nearly identical for gender, ethnicity, and percentage of freshmen. About 66% of the students lived in suite halls in the Alcohol Norms Survey and 50% in the EBI Survey. The EBI sample was drawn from all residence halls and the Alcohol Norms Survey sample was drawn from only three halls on campus.

Motivated Offenders

Despite being under the legal drinking age of 21, a minority of the students, 30% in the Alcohol Norms Survey sample and 41% in the EBI sample, identify as regularly abstaining from alcohol consumption. In the Alcohol Norms Survey, the majority of students, 54%, report consuming alcohol once a month or more frequently, and another 14% report drinking less than once a month, but do not identify as an abstainer. Similarly, in the EBI sample, 59% of students report drinking once a week or more frequently. The majority of students do not perceive that alcohol has a negative impact on the quality of life on their floor ($M = 2.45$; $SD = 1.59$); 75% of students gave a rating of 3 or less, on a scale of 1 to 7. Whereas most students do not perceive alcohol as having a negative influence on quality of life in their residence hall, abstainers do. Compared with their peers,

Table 2
Ordinal Logistic Regression Coefficients (*b*), Odds Ratios (*OR*) and Standard Errors (*SE*) for Determinants of Predicting Alcohol Consumption Frequency (*N* = 439)

	Model 1[a]			Model 2[b]			Model 3[c]		
	b	*OR*	*SE*	*b*	*OR*	*SE*	*b*	*OR*	*SE*
Gender	–0.44	0.64*	0.21	–0.85	0.43*	0.22	–0.45	0.64*	0.21
Room type (suite 1)	0.53	1.70*	0.21	0.50	1.66*	0.24	0.65	1.92**	0.21
Attitude	1.37	3.94**	0.17	1.04	2.83**	0.18	1.03	2.80**	0.15
High school use	0.76	2.15**	0.11	0.73	2.07**	0.11	0.15	1.16	0.10
Perception of friends use	0.80	2.22**	0.10	0.72	2.04**	0.12	0.40	1.50**	0.10
Frequency of drinking (frequent = 1)							0.96	2.60**	0.25
McKelvey and Zavoina's R^2	.65			.59			.46		

a. Dependent Variable = How frequently do you consume alcohol?
b. Dependent Variable = During the last 30 days, on how many days did you have 5 or more drinks with alcohol in a 3- to 5-hour period?
c. Dependent Variable = If you drink alcohol, how often do you typically consume it in another room in your residence hall?
*$p < .05$. **$p < .01$.

abstainers are 1.62 times more likely (odds ratio [*OR*] = 1.62; $p < .01$) to report that alcohol has a negative impact on quality of life, when controlling for gender, class, and room type.

Alcohol Use in the Alcohol Norms Survey

Descriptive statistics for all dependent variables are presented at the bottom of Table 1. Table 2 reports the ordinal logistic regression analysis predicting frequency of alcohol use among college students living in campus residence halls. The three dependent variables in Models 1 through 3 respectively are frequency of alcohol consumption, frequency of heavy episodic drinking, and frequency of alcohol consumption in the residence hall. Models 1 and 2, which include room type as well as gender and three individual level predictors, explain more than 50% of the variance. The strongest predictor of frequency of alcohol use (Model 1) and heavy epi-

Table 3
Ordinary Least Squares Unstandardized Regression Coefficients (*b*), and Standard Errors (*SE*) for Determinants of Number of Drinks Consumed per Event (*N* = 439)

	Model 4[a]	
	b	*SE*
Constant	0.55	0.53
Gender	−1.27**	0.22
Room type (suite = 1)	0.46*	0.21
Attitude	1.11**	0.14
High school use	0.70**	0.11
Perception of friends use	0.39**	0.10
R^2	.47	

a. Dependent variable = When you go out and socialize or party and drink alcohol, how much do you typically consume per event?
*$p < .05$. **$p < .01$.

sodic drinking (Model 2) was attitudes toward alcohol use, ($b = 1.37$; $p < .01$; Model 1), and ($b = 1.04$; $p < .01$; Model 2). After controlling for individual alcohol-use risk factors, living in a hall with suites is also a significant predictor of frequency of alcohol use ($b = 0.53$; $p < .05$). Living in a hall with suites, as compared with standard rooms, substantially increases the likelihood ($OR = 1.70$; $p < .05$) that a student will be in the next highest category on frequency of alcohol use and increases the likelihood ($OR = 1.66$; $p < .05$) that a student reports engaging in heavy episodic drinking more frequently.

Model 3 reports the frequency of drinking in the residence hall while controlling for general frequency of alcohol consumption. Similar to Models 1 and 2, attitude toward alcohol use is the strongest predictor of reporting consuming alcohol in the residence hall ($b = 1.03$; $p < .01$). As compared with Models 1 and 2, room type is a stronger predictor of consuming alcohol in the residence hall. Living in a suite nearly doubles the odds that a student will report drinking in their residence hall more frequently ($OR = 1.92$; $p < .01$).

Table 3 reports the OLS regression results for the number of drinks consumed per event. Model 4 uses the same predictors as Models 1 and 2 and accounts for nearly half the variance ($R^2 = .47$). Gender and attitudes have

Table 4
Ordinal Logistic Regression Coefficients (*b*), Odds Ratios (*OR*), and Standard Errors (*SE*) for Determinants of Alcohol Variables (*N* = 424)

	Model 5[a]			Model 6[a]			Model 7[b]			Model 8[b]		
	b	*OR*	*SE*	*b*	*OR*	*SE*	*b*	*OR*	*SE*	*b*	*OR*	*SE*
Gender	–0.73	0.48**	0.19	–0.73	0.48**	0.26	–0.49	0.61*	0.19	–0.47	0.62	0.25
Room type (suite = 1)	0.39	1.47*	0.18				0.61	1.84*	0.18			
Male floor[c]				–0.39	0.68	0.32				–0.52	0.60	0.31
Female floor[c]				–0.58	0.56*	0.23				–0.75	0.74*	0.23
McKelvey and Zavoina's R^2	.05			.06			.04			.05		

a. Dependent variable = number of alcoholic drinks consumed per event.
b. Dependent variable = frequency of alcohol consumption.
c. Comparison group = coed floor.
*$p < .05$. **$p < .01$.

the strongest impact on number of drinks consumed. Women consume, on average, 1.27 ($p < .01$) drinks less than men, and as one's attitude toward drinking and getting drunk becomes more tolerant, the average number of drinks consumed increases by 1.11 ($p < .01$). Living in a hall with suites increases the number of drinks consumed on average by half a drink ($b = .46$; $p < .05$).

Alcohol Use in the EBI Survey

The results from this survey are presented in Table 4. The R^2 in these models are low (.04 to .06) because this survey of resident satisfaction does not include the individual risk factors that account for most of the variance in consumption of alcohol. We include this EBI Survey data because this is an exploratory study and the data is highly comparable with the data from the Alcohol Norms Survey. This data set has the advantage of including students from all residence halls on campus in contrast to the smaller sample of halls in the Alcohol Norms Survey. In addition, two models are presented for each dependent variable. Models 5 and 7 use room type as one predictor, whereas Models 6 and 8 analyze the same dependent variables but replace room type with gender of floor as a

predictor. Gender of floor and room type have been included in separate models because the variables are highly correlated, which creates problems with multicollinearity. On this campus, all halls are coed, single-sex floors exist only in the halls with standard rooms, and coed floors are predominantly suite halls (with only one exception). Because these two variables capture similar information, they were analyzed in separate models.

Table 4 presents the results of ordinal logistic regression predicting the number of alcoholic drinks consumed per event (Models 5 and 6). In Model 5, living in a hall with suites is associated with a higher odds of drinking more than those living in a hall with standard rooms ($OR = 1.47$; $p < .05$). In Model 6, men living on single-sex floors do not consume alcohol in significantly different quantities than men living on coed floors ($b = –0.39$; $p > .05$). In contrast, women living on single-sex floors are about half as likely to consume as much as their peers living on coed floors ($OR = 0.56$; $p < .05$).

Models 7 and 8, in Table 4, report the ordinal logistic regression results for predictors of frequency of alcohol consumption. Even without the individual risk factors controlled for in this model, the coefficients for gender and room type are nearly identical to the coefficients in Table 1, Model 1, for the similar variable in the Alcohol Norms Survey. In Model 7, gender significantly predicts frequency of consumption ($b = –0.49$; $p < .05$), compared with gender in Model 1 where $b = –.44$ ($p < .01$). Living in a hall with suites nearly doubles the odds of drinking more frequently ($OR = 1.84$; $p < .01$), which is quite similar to the OR in Model 1 ($OR = 1.70$; $p < .05$).

In comparison, Model 8 shows that men living on single-sex floors do not consume alcohol significantly more or less often than men on coed floors ($b = –0.52$; $p > .05$). In contrast, women living on a single-sex floor are significantly less likely to consume as frequently as their peers on coed floors ($OR = 0.74$; $p < .01$).

Discussion

These exploratory findings suggest that the majority of students living on campus are motivated offenders and that living in a hall with suites increases the situational motivation to drink alcohol. Even when controlling for other important predictors of drinking behavior (e.g., attitudes, gender, high school drinking, and perceptions of peer drinking), students residing in suite halls had a higher odds of drinking more frequently, drinking more often in their residence halls, heavy episodic drinking, and drinking more

alcohol when they socialize. In addition, women living on all-female floors were found to drink less and less often than women living on coed floors. Microenvironmental factors appear to have a significant effect on alcohol use among college students, but the mechanism behind the influence of the residence hall environment remains unclear and needs to be investigated further. Findings will be interpreted in light of the theory of routine activity (Cohen & Felson, 1979; Osgood et al., 1996).

Built Environment Explanations

Student density could affect residence hall drinking. Shick-Tryon (1985) found that students drinking more alcoholic drinks per week were those with higher numbers of students residing per room. In our study, suite halls may have increased the perception of density, which may create feelings of stress and crowding that lead to increased drinking. However, density does not always create negative feelings such as stress and may actually magnify positive feelings instead (Freedman, 1975). Alternatively, suite halls may increase the opportunity for informal social interaction (situational motivation) and the number of students (motivated offenders) that could be gathered into a room to drink, as suites have adjoining rooms, which make a larger gathering possible. Similarly, deluxe rooms would also offer the potential for hosting a larger group of students for socializing and drinking. This interpretation is in line with the theory of routine activity in that as compared with single halls, suite halls may increase the situational motivation to consume alcohol by increasing opportunities for routine social interaction in which larger numbers of motivated offenders can partake in alcohol use.

Visibility may be an environmental mechanism that increases the potential for underage alcohol consumption by reducing capable guardianship. For example, Rubington (1990) suggests that residence hall floor layouts created different communication patterns about alcohol between RAs and students. Specifically, RAs in high visibility residence halls may teach more responsible drinking for residents' alcohol use when compared with RAs in halls with lower visibility. In our study, suite residents are less visible to others because they do not have to leave their rooms to go to the bathroom and more students can fit in a room to drink without being seen. Therefore, suite halls offer a greater sense of privacy (e.g., decreased visibility) as compared with standard rooms (Corbett, 1973), which in turn may increase alcohol use. Decreased visibility in suites may hinder the role of RAs or

other peers acting as capable guardians who would serve to deter alcohol use.

Furthermore, the residence hall built environment may influence drinking behavior because of the perception of a "community atmosphere." Over the past decade, universities began making significant changes in residence hall design to attract and retain students. Universities have moved away from standard halls with community bathrooms to designing apartments, suite halls, or clusters (Clemons et al., 2004), and administrators argue that the new designs foster a sense of community, interaction, and communication (Devlin, Donovan, Nicolov, Nold, & Zandan, 2008; Godshall, 2000). Indeed, Gerst and Sweetwood (1973) found that students judged the social climate of suite halls as more supportive, involving, and innovative than standard halls. In support of this suggestion, LaBrie et al. (2008) found that women who reported stronger relational health (similar to a higher sense of community) and higher social motives for drinking, consumed more alcohol than women who reported weaker relational health. According to the theory of routine activity, behaviors such as alcohol use can be socially rewarding (Osgood et al., 1996). If suite halls increased a sense of community, we would expect them to also increase alcohol use because of the apparent social rewards involved. However, Devlin et al. (2008) suggest the opposite—in that suite or clustered rooms may actually *decrease* the "sense of community" when compared with typical standard rooms. Devlin et al. (2008) suggest that this finding may be the result of suite/cluster students being less integrated into the entire residence hall because they tend to only interact with students from their suite/cluster instead of students from the rest of the hall. Therefore, alcohol use could be related to a lower sense of community. Future research should investigate the relation between sense of community, residence hall design, and rewards for alcohol use through the perspective of the routine activity theory.

Coed Versus Suite Halls

Our findings suggest that the relation between floor type (e.g., coed vs. single gender) and room type or hall design (suite vs. standard) needs to be investigated further. Harford et al. (2002) found that students in coed residence halls experienced more negative consequences related to drinking than students living in single-gender halls. Similarly, Wechsler et al. (2000) reported that students living in coed halls had heavier episodic drinking than those living in single-gender halls. However, halls with coed floors may also be designed as suites because of the architectural advantages that

suite halls have in being able to host coed floors. Previous studies of adolescent drinking behavior suggest that girls may be more susceptible to peer influence, particularly when opposite-gender friends are present (Dick et al., 2007). Therefore, coed floors may inadvertently be negatively affecting female drinking behaviors because of the presence and influence of males and male drinkers. Future research should tease apart the influences of these social and design factors.

Implications for Interventions, Programming, and Design

These findings have implications for university administrators and others conducting interventions to decrease drinking on campus. Because drinking patterns may differ based on residence hall design, interventions may be more or less suitable for different types of halls and their residents. For example, social norms campaigns are popular and use normative messages to reduce students' alcohol use (Campo & Cameron, 2006). However, Campo and Cameron (2006) found that social norms messages aimed at reducing alcohol use produced an unhealthy attitude change toward drinking among those who drank the most and a healthy attitude change toward drinking among those who drank the least. Therefore, social norms campaigns might not be as effective for those in suite halls and could have a paradoxical effect (i.e., lead to increased drinking).

Campus architects are designing suite halls to increase community, to aid in student retention, and to foster better academic outcomes for students (e.g., living learning communities). However, administrators should consider the potential negative outcomes that we have discussed. More research is needed on the built environment related to alcohol use on college campuses.

Limitations and Future Directions

Our study was conducted on only one U.S. college campus. Although the results from the two samples were consistent, the generalizability of these results is limited. A multicampus study is needed to replicate our findings. This exploratory study has provided many fruitful directions for future investigation. For example, exploration of how students choose the residence halls that they reside in may provide useful information about alcohol use in residence halls. A self-selection bias may be operating with students choosing residence halls based on their expectation of heavier drinking patterns in some residence halls over others. Finally, because this

study focuses on only one facet of design (suite vs. standard rooms), other residence design issues (e.g., living space, occupancy), and theme-specific halls (e.g., honors, substance free) should be investigated to determine their impact on drinking behaviors. It is possible that deluxe halls may share features with suite halls related to visibility and density.

Conclusions

In this exploratory study using the theory of routine activity as an organizing framework, patterns of drinking differed based on residence hall design (suite vs. standard). Questionnaires used on college campuses to assess alcohol use and risk factors should include a question regarding residence hall design or room type in addition to existing questions on residence location (e.g. on-campus, fraternity, residence hall), and coed residence as well as measures of opportunities for unstructured social interaction in the hall. Future research should explore the risks related to the on-campus built environment and the associated impact on residence hall programming and interventions to reduce alcohol use in the residence halls.

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