

Alcohol Use among College Students: The Effects of Prior Problem Behaviors and Change of Residence*

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ABSTRACT. *Objective:* This article examines the relationship between prior problem behaviors and change in residence on alcohol use patterns among college students. *Method:* Measures of alcohol consumption (e.g., drinking frequency, average consumption and frequency of heavy episodic drinking were related to residence patterns and prior problem behaviors (e.g., conduct problems, illicit substance involvement and early age at onset of alcohol consumption). Subjects ($N = 2,465$; 51% women) were a subsample drawn from the National Longitudinal Study of Labor Market Experience in Youth. The analysis was conducted using a linear growth model for continuous outcomes with time-invariant and time-varying covariates for each of the drinking measures. *Re-*

sults: The results of the structural equation analysis yielded significant and direct effects related to residence patterns and prior problem behaviors. Problem behaviors were related to drinking measures; however, there was no evidence for a mediational hypothesis. Neither was there systematic evidence that the relationship between prior problem behavior and alcohol use was mediated by residence patterns. The analysis of change in residence was related to both time-specific and longer-term influences on alcohol use. *Conclusions:* The presence of direct and independent effects for both dispositional and high-risk environmental factors in collegiate drinking practices support targeted and diverse strategies for prevention activities. (*J. Stud. Alcohol* 62: 306-312, 2001)

RECENT STUDIES concerning the drinking practices of college students have examined the influences of normative and situational aspects of residence (especially for students in fraternities and sororities) on heavy episodic alcohol consumption and alcohol-related problems (Bachman et al., 1984; Baer et al., 1995; Cashin et al., 1998; Gfroerer et al., 1997; Goodwin, 1989; Lo and Globetti, 1995; Martin and Hoffman, 1993; Turrisi, 1999; Wechsler et al., 1998). Wechsler et al. (1994), in the most recent and comprehensive picture of collegiate drinking at the national level, have documented the widespread pattern of heavy episodic drinking (i.e., five or more drinks on an occasion) on college campuses and report that fraternity/sorority residence is one of its most powerful predictors (Wechsler et al., 1995). Support for the effects of residential patterns on alcohol use among college students is strengthened by studies employing longitudinal designs. This research has shown that alcohol and other drug use rates tend to increase as students leave home and move to on- or off-campus col-

lege residences (Bachman et al., 1984; Baer et al., 1995; Leibsohn, 1994; Lo and Globetti, 1995). Baer et al. (1995) examined the transition from high school to college in a sample of high-risk drinkers ($n = 366$) and found that students living in fraternities or sororities, when compared with students living in dormitories, reported increased rates of drinking frequency and average consumption. A smaller sample of off-campus students ($n = 35$) reported lower rates of increased consumption when compared with on-campus students but did not differ in terms of alcohol-related problems.

Problem behavior and heavy drinking in high school also have been shown to be important predictors of alcohol problems in college populations (Jessor et al., 1991; Wechsler et al., 1994, 1995). Few studies of college students have examined simultaneously the effects of prior problem behavior and exposure to high-risk environments on drinking problems. Baer et al. (1995) noted that men with prior conduct problems who live in fraternities exhibited greater increases in alcohol consumption and alcohol-related problems. The interactions between conduct history and residence reported by Baer et al. (1995) were not consistent across all drinking measures; however, they are suggestive and in need of more systematic study. Is college residence a reflection of prior conduct problems (a mediational hypothesis), or does residence moderate the effects of prior conduct problems, or are these behavioral dispositions and high-risk environment exposures direct and independent effects? Examination of these questions has important impli-

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cations for the development of both theoretical models of drinking and targeted prevention strategies (Turrissi et al., 2000).

This study examines the relationships between residence and prior problem behaviors and the drinking patterns of college students over a 3-year period. Examination of factors associated with residence (e.g., parental education, parental drinking problems, prior conduct problems) and college characteristics (e.g., year in school, 2-year vs 4-year programs) are additional study objectives.

Method

Sample

The present study provides a secondary analysis of the National Longitudinal Survey of Youth (NLSY), an annual survey of 12,686 young people throughout the United States (Ohio State University, 1994). The survey was initiated in 1979 and comprised a representative sample of men and women who were aged 14 through 21 on January 1, 1979. The procedures and methods used to design the database are described elsewhere (Frankel et al., 1983). The current analysis is restricted to the years 1982-84, for which alcohol measures are available. The baseline sample ($N = 2,465$) is composed of all respondents attending college as undergraduates in 1982 ($n = 1,950$) and those high school students in 1982 who attended college in either 1983 and/or 1984 ($n = 515$).

The sample was 51% female and 75% white. Prior problem behaviors were distributed as follows: conduct behavior, 26%; illicit substance involvement, 40%; early onset of alcohol use, 17%. Approximately 17% of the parents were reported to have problems with alcohol; 47% of parents had college backgrounds. The college sample was distributed by grade in 1982 as follows: first year, 696; second year, 570; third year, 396; fourth year, 288. During the 3-year period, approximately 70% attended 4-year colleges and approximately 82% attended on a full-time basis. The sample was distributed by geographic region as follows: Northeast, 20%; North Central, 25%; West, 19%; South, 36%.

Measures

Alcohol use 1982-84. Comparable measures of alcohol use were the total number of drinking days in the past week and the average number of drinks per drinking day for the years 1982-84. The choice of a 7-day measure of alcohol use was based on the availability of comparable measures over the 3-year period. Cross-sectional analyses with 30-day measures for 1983 and 1984 yielded findings comparable to those with the 7-day measure. Prior studies have successfully modeled drinking relationships using 7-day re-

call measures (Curran et al., 1998; Meilman et al., 1997). The measure of heavy episodic drinking was how often the respondents had six or more drinks on one occasion during the last 30 days (0 = never, 1 = once, 2 = 2-3 times, 3 = 4-5 times, 4 = 6-7 times, 5 = 8-9 times, 6 = 10 or more times).

Residence. Current residence for each year was coded as follows: (1) living at home with parents; (2) living in a college dorm, fraternity or sorority; (3) living in own dwelling unit. The NLSY does not distinguish the dormitory system from the Greek house. Residence is scored as two dummy variables comparing dormitory—including fraternity/sorority (= 1)—and own residence (= 1) with living at home with parents (= 0). A second set of dummy variables was created to examine the effects of a change in residence from living at home with parents (= 0) to either dormitory or own dwelling unit (= 1) at each time point. The change score was based on a subsample of 1,968 respondents. Change of residence is scored as four dummy variables comparing (1) 210 respondents who moved from home in 1982, (2) 274 who moved in 1983, (3) 221 who moved in 1984, (4) 582 living away from home over the course of the study, with the 681 respondents who remained living at home over the course of the study serving as the referent category. Excluded from the analysis were 484 respondents who moved from home and back again during the study and 13 respondents with missing data on 1981 residence.

Background variables. Background variables that were covariates in the analysis were age, gender (male), race (black), parental education (college for either parent versus no college), family history of parental alcohol problems, the number of property/person offenses in 1980 (0-11), illicit substance involvement (marijuana and other drug use versus none) in 1980, and early onset of alcohol use in 1982 (onset at 15 years or less).

Time-varying variables. Time-varying covariates for each year of analysis were a dummy variable for marital status (married); three dummy variables for geographic region (Northeast, North Central and West) with South as the referent; three dummy variables for year in school (2nd, 3rd, 4th); school status (full-time versus part-time); and type of college (4-year versus 2-year).

Statistical analysis

Preliminary analyses. Cross-sectional logistic regression models for each year were constructed to identify background variables related to college residence. Simple regression models were constructed for each drinking measure, to examine the full set of predictors for each year. To test the mediational hypothesis (i.e., residence mediates the relationship between prior problem behaviors and alcohol use patterns), separate models were conducted with and with-

out the residence variables. Based on evidence that prior problem behavior is related to alcohol use, mediation is present if the relationship between prior problem behavior and alcohol use is absent (i.e., perfect mediation) or reduced when the residence variables are included in the model (Baron and Kenny, 1986). Each problem indicator was entered separately and in combination to assess its impact on the drinking measures. Additional models examined interactions between each of the problem indicators and the two dummy variables for residence.

For the subset of students attending college, additional regression models were constructed to examine the relationships between college characteristics (e.g., 2-year/4-year programs, geographic region), enrollment factors (e.g., year in school, full-/part-time status), and demographics and alcohol use patterns.

Growth models. The analysis of alcohol use over time is carried out within a latent variable framework (see, for example, Muthén and Curran, 1997). The examination of drinking patterns for the years 1982-84 used a linear growth model for a continuous outcome with time-invariant and time-varying covariates for each of the three alcohol measures (frequency, average consumption and frequency of heavy episodic drinking). The three repeated measures of alcohol use were defined as multiple indicators on the two unobserved latent growth factors. The first factor, the intercept, represents the initial starting point of the alcohol use growth trajectory. The second factor, a linear term, represents the initial slope of the curve. The latent growth factors were regressed on the background measures (age, gender, race, parental education, family history, conduct offenses, illicit substance involvement and age at onset) to assess for potential group differences in the means of the two growth factors. The inclusion of the time-varying covariates for each of the three time periods captures the extent to which the developmental growth trajectory of alcohol use over time was altered due to time-varying covariates. A series of models of increasing complexity was constructed. First, an unconditional growth model was estimated, to examine overall group growth trajectories and to test for individual variability in change over time. Second, the model was extended to include the main effects of the time-invariant background variables. Third, the model was extended to include the direct effects of time-specific changes in residence and the additional time-varying covariates (i.e., marital status and geographic region). This sequence was repeated for that subsample of respondents for which change of residence from home to dormitory and own dwelling unit was investigated. All growth models were estimated using Mplus (Muthén and Muthén, 1998). Model fit was evaluated using the maximum likelihood ratio test statistic (chi square) and the root mean square error of approximation (RMSEA).

Results

At baseline, 92% of the sample reported ever having used alcohol; 64% reported using it in the past month and 47% in the past week. More than a third (35%) reported drinking six or more drinks on one occasion one or more times in the past month. Mean scores for alcohol use over the 3 years are as follows: Frequency: 1982, 0.99; 1983, 1.09; 1984, 1.18; Average consumption: 1982, 0.89; 1983, 0.88; 1984, 0.87; Heavy drinking: 1982, 1.80; 1983, 1.86; 1984, 1.92.

Residence. Characteristics related to dormitory and own dwelling residence, (as opposed to living at home with parents) were analyzed among students attending college in each year. When compared with students living at home, students in dorms were younger, male, black, not married, attending 4-year colleges on a full-time basis and had parents with some college education. Prior problem indicators, with one exception, were not related to dormitory residence. Students with prior illicit substance involvement were less likely to reside in dormitories, in 1984, but were more likely to report problem drinking among parents.

When compared with students living at home, students residing in their own dwelling units were older, nonblack, married, had prior histories of conduct problems (in 1983 and 1984) and illicit drug use (in 1982 and 1983). They were less likely to be of full-time status in 1982 and more likely to attend 4-year colleges in 1984. Parental education and problem drinking were unrelated to living at home or in own dwelling units. The significant associations between prior conduct and illicit substance use with on-campus residence are suggestive of a possible mediational model (Baron and Kenny, 1986).

Cross-sectional findings. There were significant and consistent main effects for each drinking measure and each year of study for the following variables: gender, race, marital status, conduct problems, illicit substance involvement, early onset of alcohol use and residence. Age was not systematically related to the drinking measures. Parental education was related to drinking frequency but not to average consumption or frequency of heavy episodic drinking. Parental drinking problems were unrelated to the alcohol use measures. There were some significant associations between geographic region and alcohol use, but they were not systematic across years of study and all drinking measures. The nature of the relationships will be elaborated on in the growth analyses section.

Comparisons of regression models with and without the residence variables did not provide any support for the mediational hypothesis regarding prior problems and residence. Of the 18 interactions assessed (two dummy residence variables for each of 3 years and three drinking measures), only three were significant. Students with prior illicit sub-

stance use, residing in dorms in 1983 compared with living with parents, reported higher levels of average consumption. Subsequent gender analysis indicated that this interaction was significant for women but not for men. The other two significant interactions were negative and related to the frequency of heavy episodic drinking. Prior conduct behavior was significantly moderated by dormitory residence in 1983 and by own dwelling units in 1984. Students with prior conduct problems residing in dorms, in 1983, compared with living with parents, and students with prior conduct problems residing in own dwelling units, in 1984, compared with living with parents, reported lower frequencies of heavy episodic drinking. Subsequent gender analyses indicated that these interactions were significant for men but not for women. Given the inconsistency of the interaction patterns (they did not significantly improve model fit), these were excluded from the final growth model.

The results of the cross-sectional regression analyses of alcohol use among the subsample of students attending college in each year did not yield consistent findings related to year in school. Weekly frequency in 1983 and 1984 was higher among upperclass students and the frequency of heavy episodic drinking was lower among upperclass students in 1983. Enrollment status (i.e., full time) and type of college (i.e., 2-year, 4-year) were not related to drinking measures, with one exception. Weekly drinking frequency was lower in 1984 among full-time versus part-time enrollments. College students not attending college in 1983 or 1984 (all respondents were in school at baseline in 1982), when compared with students attending college, reported statistically significant increases in weekly frequency of alcohol use but did not differ in average consumption or frequency of heavy episodic drinking.

Latent growth analysis. The first latent growth model was a three-indicator, two-factor unconditional growth model of alcohol use over the three time points for each of the three alcohol measures. For each latent factor (intercept and slope), the means and variances were positive and significant for drinking frequency, indicating increasing alcohol use over time and individual variability around the group average (intercept) and change (slope) over time, respectively. The intercept mean and variance were significant for average consumption, as was the slope variance but not the slope intercept. Both factor means and variances were positive and significant for frequency of heavy episodic drinking.

The full growth model is presented in Table 1. For each drinking measure, age was a significant and positive predictor of the intercept factor and a significant and negative predictor of the slope factor. Each of the background variables was significantly related to the intercept factor and not related to the slope factor. For each drinking measure, male students reported significantly higher intercept scores

than did female students, and black students reported significantly lower intercept scores than did nonblack students. For each drinking measure, each prior problem behavior (i.e., conduct problems, illicit substance involvement and early age at onset of alcohol use) was significantly related to the intercept factor. The slope for early onset of heavy use was significant and negative. Parental education (i.e., some college) was a significant and positive predictor of drinking frequency, but not average consumption or the frequency of heavy episodic drinking. Parental problem drinking was not related to any drinking measure and was excluded from the final model.

For each drinking measure, dormitory residence, when compared with living with parents, was significantly and

TABLE 1. Growth models of alcohol use measures including background variables and time specific measures of residence

	Frequency		Average use		Heavy use	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Age	.22*	-.21*	.08*	-.15*	.14*	-.24*
Gender (male)	.33*	.14	.37*	.13	.41*	.07
Race (black)	-.41*	-.03	-.47*	-.04	-.54*	-.13
Conduct problems	.06*	-.01	.07*	.01	.09*	-.01
Illicit substance involvement	.54*	-.14	.40*	-.11	.46*	-.02
Onset of alcohol use	.22*	.18	.34*	.01	.32*	-.28*
Parental education (college)	.20*	.03	.05	-.04	.07	.05
Time-specific effects						
Residence						
Dormitory						
1982	.26*		.50*		.69*	
1983	.30*		.39*		.47*	
1984	.24*		.38*		.43*	
Own dwelling						
1982	.28*		.31*		.39*	
1983	.20*		.20*		.31*	
1984	.32*		.17*		.24*	
Marital status						
1982	-.50*		-.64*		-.95*	
1983	-.30*		-.47*		-.75*	
1984	-.52*		-.42*		-.73*	
Region						
Northeast						
1982	.15*		.30*		.48*	
1983	.16*		.23*		.39*	
1984	.14*		.16*		.41*	
North central						
1982	.04		.14*		.52*	
1983	.03		.20*		.37*	
1984	.04		.19*		.34*	
West						
1982	-.08		-.06		.01	
1983	-.14		-.06		-.14	
1984	-.04		-.11		-.28*	
Chi square (44 df)	91.7*		66.5*		52.1	
RMSEA ^a	.021		.015		.009	

Note: All values are in standardized metric.

^aRoot mean square error of approximation.

* $p < .05$.

positively related at each time point to increases in alcohol consumption above that which would be expected by the growth trajectory. The pattern of own dwelling residence was similar to that of dormitory residence.

The effects of marital status (i.e., marriage) were significant and negative in all models. Respondents in the Northeast region, compared with the South, reported higher levels of alcohol use in all models. Respondents in the North Central region reported higher average consumption and higher frequencies of heavy episodic drinking. Respondents in the Western region, with one exception, did not differ from those in the South. The frequency of heavy episodic

drinking was significantly lower in the West in 1984, when compared with the South.

The growth model that examined the effects of changes in residence patterns in the year prior to assessment on the alcohol use growth trajectories—the effects of moving away from parents—is presented in Table 2. The results associated with the background variables are similar to those from previous models and need no further elaboration. Of key interest is the finding that the three additional intercept factors (representing change in alcohol use due to a change in residence from home to either dormitory or own dwelling residence) were significantly and positively associated with

TABLE 2. Growth models of alcohol use measures including background variables and time specific measures of change in residence

	Frequency		Average use		Heavy use	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Age	.19*	-.24*	.04	-.15*	.08*	-.18*
Gender (male)	.30*	.21*	.36*	.19*	.38*	.09
Race (black)	-.39*	-.04	-.46*	-.05	-.51*	-.09
Conduct problems	.06*	-.02	.07*	.01	.10*	-.04
Illicit substance involvement	.55*	-.15	.41*	-.11	.47*	-.08
Onset of alcohol use	.16*	.23	.31*	.05	.24*	-.18
Parental education (college)	.18*	.02	.03	-.04	.07	-.04
Time-specific effects						
Residence in 1981						
1982	.48*		.48*		.83*	
1983	.46*		.36*		.72*	
1984	.54*		.37*		.63*	
Residence change in 1982						
1982	.43*		.60*		.82*	
1983	.31*		.37*		.70*	
1984	.41*		.25*		.68*	
Residence change in 1983						
1983	.36*		.42*		.62*	
1984	.37*		.46*		.57*	
Residence change in 1984						
1984	.25*		.26*		.53*	
Marital status						
1982	-.56*		-.68*		1.06*	
1983	-.30*		-.50*		-.73*	
1984	-.49*		-.48*		-.79*	
Region						
Northeast						
1982	.13		.30*		.45*	
1983	.18		.23*		.36*	
1984	.12		.18*		.42*	
North Central						
1982	.04		.07		.47*	
1983	-.03		.17*		.36*	
1984	.02		.16*		.29*	
West						
1982	-.03		-.12		.04	
1983	-.14		-.10		-.14	
1984	-.01		-.11		-.27	
Chi square (35 df)	62.2*		58.9*		39.2	
RMSEA ^a	.021		.019		.019	

Note: All values are in standardized metric.

^aRoot mean square error of approximation.

* $p < .05$.

changes in alcohol use over time. Regardless of the time point at which an individual's residence changed, there was a corresponding additional increment to the alcohol use trajectories, when compared with those students who lived at home with parents for all three time points. With a few exceptions, each change in residence was significantly and positively associated with changes in alcohol use in subsequent years (i.e., the change in residence in 1982 was related to alcohol use in 1983 and 1984).

Discussion

The present findings are based on a secondary analysis of the National Longitudinal Survey of Youth (NLSY) and several caveats and limitations of the study should be stressed. First, this study was not designed to test hypotheses concerning collegiate drinking patterns. A large proportion of the respondents in the NLSY began college prior to the inclusion of drinking measures, in 1982, limiting the analysis to those years in which alcohol use was included. Second, the analysis covers respondents attending college in the years 1982 through 1984 and may not be representative of current college experiences. Alcohol consumption among college students seems to have been constant over the last 20 years; however, more students now report drinking to intoxication and at higher rates than before (Wechsler and Isaac, 1992; Wechsler et al., 1998). Third, the NLSY does not include specification of fraternity or sorority residence for those students living away from home. Last, the analyses are based on self-reports.

Prior problem behaviors yielded significant and direct effects with each drinking measure, effects independent of exposure to high-risk environments and not significant confounders of the estimates of residence patterns on the alcohol use trajectories. Despite some variation in residence patterns by background predictors, there was no support for the mediational hypothesis, and the moderating effects of residence on the relationship between prior problem behavior and alcohol use were limited and not systematic across drinking measures and year of study.

The cross-sectional analyses of students attending college indicated that upperclass students reported increased drinking frequency but a lower frequency of heavy episodic drinking. These patterns are consistent with other studies, which indicate that the drinking patterns of college students are similar to those of former college students and reflective of socioeconomic differences found in the adult population (Crowley, 1991; Gfroerer et al., 1997).

Systematic direct effects were associated with residence patterns and changes in residence patterns over the 3-year period. When compared with students living at home with parents, students residing in dorms and their own dwelling units reported significant elevations in the growth trajectories for each drinking measure.

The analysis of change of residence, yielding time-specific increases in the alcohol trajectories associated with change of residence in the past year, also indicated significant longer-term impacts on drinking. We are unable to disentangle these effects in the present study, but the patterns suggest strong support for exposure to high-risk environments, as opposed to the effects of short-term liberalization from parental control. On the other hand, findings from the present study indicate that students with prior problems in high school were more likely to reside in their own dwelling units, in settings further removed from both parental and other adult controls.

Baer et al. (1995) reported that fraternity/sorority residence yielded higher rates of drinking when compared with dormitory living. Although we were unable to distinguish the effects of dormitory residence from those of Greek houses, the present sample was well represented by students living in their own dwelling units and yielded significant increases in alcohol consumption at each time point for this group. Subsequent analyses of the subsample living away from home (data not shown) revealed no significant differences in alcohol patterns between students living in dorms or in their own dwelling units. The differences associated with residence may reflect the differential exposure to the college drinking culture, an exposure somewhat attenuated for students living at home.

The literature indicates that most students "mature out" of heavy alcohol use and alcohol-related problems (Fillmore, 1988; Friend and Koushki, 1984; Klein, 1994; Saltz and Elandt, 1986; Temple and Fillmore, 1985-86; Wechsler et al., 1998). Based upon the present findings, it might be hypothesized that the two risk factors (i.e., dispositional and high-risk environments) may pose differential risk with respect to longer-term outcomes. College residence may be short term in effect, whereas conduct problems may have more long-term effects as reflected by studies in the general population that show that college-educated adults are not immune from alcohol problems. Subsequent analyses of the NLSY, now in progress, examine the effects of both dispositional and environmental factors on future drinking trajectories and the development of alcohol-related problems and alcohol dependence in this collegiate sample.

The presence of direct and independent effects of both prior problem behaviors and college residence on drinking patterns argue for specific and targeted intervention approaches to alcohol prevention on college campuses. Whereas respondents with more severe problem behaviors may not attend college, or even complete high school, sizeable proportions in the present college sample exhibited high-risk behaviors prior to attending college (26% reported three or more conduct problems and 40% reported illicit substance involvement). The relationship between prior problem behaviors and alcohol use during college directs attention to the need for specific high school interventions

targeted at college-bound seniors. The finding of the present study that students with prior problem behaviors were more likely to reside in their own dwelling units suggests modifications and extensions of on-campus environmental approaches to address these dispositional risk variables.

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