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Selection and Socialization of Risky Drinking during the College Transition:The Importance of Micro-Environments Associated with Specific Living Units

Aesoon Park, **Kenneth J. Sher**, and **Jennifer L. Krull**

Abstract

Risky drinking among college students differs as a function of living types, with on-campus living, especially Greek residence, as a major risk factor. Both self-selection based on prior drinking and socialization of risky drinking through living environments have been shown to account for this association. However, it is not clear whether selection and socialization processes occur as a function of specific living units within certain living types. Multilevel models using a longitudinal sample of incoming first-year students (N = 2,392) demonstrated that (1) selection into specific living units within both fraternity houses and residence halls occurred on a basis of pre-college drinking (over and above selection into the Greek system in general), (2) these selection effects were accounted for by college attendance motives and cigarette use at the living unit level, (3) socialization of extremely risky drinking among certain fraternity houses was greater than other houses (over and above greater socialization of living at fraternity houses than residence halls in general), and (4) these socialization effects were accounted for by perceived peer drinking norms and alcohol availability at the living unit level. These findings demonstrate both general effects of living types and specific effects of living units in the association between living environments and risky drinking during the college transition.

Keywords

alcohol use; college drinking; residence; fraternity and sorority affiliation; multilevel model

Risky drinking and its associated consequences on college campuses are major public concerns. College students consistently report higher rates of heavy drinking (Johnston, O'Malley, & Bachman, 2003; Slutske et al., 2004) than their non-student peers, although inconsistent differences emerge in other measures of alcohol use and misuse (White, & Jackson, 2004/2005). The transition from high school to college is a particularly crucial period associated with risky drinking among college-bound individuals. College students' rates of heavy drinking (Johnston, O'Malley, & Bachman, 2001a, 2001b) and alcohol-related problems (White, Labouvie, & Papadaratsakis, 2005) rapidly increase when they enter college and do

Correspondence regarding this article should be addressed to Aesoon Park, University of Missouri-Columbia, Department of Psychological Sciences, 200 South 7th St., Columbia, MO 65211-0001. apqzb@mizzou.edu..
Aesoon Park, Kenneth J. Sher, and Jennifer L. Krull, Department of Psychological Sciences, University of Missouri-Columbia and the Midwest Alcoholism Research Center, Columbia, Missouri. Aesoon Park is now at the Department of Psychiatry, Yale University School of Medicine, and Jennifer L. Krull is at the Department of Psychology, University of California, Los Angeles.

not decrease until after college; this dramatic increase among college students contrasts with the steady decrease after high school among their non-student peers. These findings highlight the need to identify factors that contribute to increases in risky drinking during the college transition.

Drinking behaviors among college students differ as a function of living arrangement (Fromme, Corbin, & Kruse, 2008; Harford, Wechsler, & Muthén, 2002; Harford & Muthén, 2001). College living arrangements can be characterized as living types (on-campus living such as residence halls and Greek houses and off-campus living such as living with parents, relatives, friends, strangers or alone) and living units (specific units of, for example, residence halls or apartments). On-campus living in general is associated with heavier drinking than off-campus living, especially living with parents (Dawson, Grant, Stinson, & Chou, 2004; Presley, Meilman, & Cashin, 1996). Among on-campus living types, living in Greek houses is associated with a greater level of alcohol use and misuse, compared to living in residence halls. A national study found that over half of Greek house residents, contrasted with one fourth of residence hall residents, were frequent binge drinkers (Wechsler, Kuo, Lee, & Dowdall, 2000). Living in Greek houses was the strongest correlate of binge drinking out of 33 individual differences examined (Wechsler, Dowdall, Davenport, & Castillo, 1995). Interestingly, Greek members living in Greek houses were more likely to engage in frequent binge drinking and to experience negative consequences than not only non-Greek members but also Greek members who did not live in Greek houses (Wechsler, Kuh, & Davenport, 1996). This finding suggests that Greek residence has a detrimental effect on risky drinking over and above mere Greek affiliation.

Extant evidence appears to indicate that the association between on-campus living environment and risky drinking is accounted for by both self-selection (i.e., individuals select into specific residence on a basis of their prior drinking patterns) and socialization (i.e., living environments affect residents' drinking behaviors). Residents in Greek houses showed not only heavier drinking at precollege but also greater increases in alcohol use and negative consequences in college than did residents in residence halls (Larimer, Anderson, Baer, & Marlatt, 2000). Even in a sample of problem drinkers at precollege, selection into Greek residence among more problematic drinkers and greater socialization of alcohol use and problems among residents in Greek houses than those in residence halls were found during the college transition (Baer, Kivlahan, & Marlatt, 1995). These selection and socialization processes also appear to occur within residence halls; a recent study (McCabe et al., 2007) found that students living in residential learning communities reported a lower level of precollege drinking and a smaller increase in the maximum number of drinks consumed than did those living in traditional residence halls.

Of particular interest, there are considerable differences in drinking among specific living units within on-campus living. Differences in alcohol-related factors among Greek houses were first characterized by Larimer, Irvine, Kilmer, and Marlatt (1997). Members of Greek houses with reputations for high alcohol use perceived their house reputation as more positive and risky drinking as more acceptable than did members of houses with reputations for low or average alcohol use. About one fifth of the variance in alcohol use and consequences among Greek members was attributed to differences in characteristics of Greek organizations, as opposed to characteristics of individuals (Caudill et al., 2006; Reis & Trockel, 2003). Specifically, chapters' total number of members (Caudill et al., 2006) and chapter-level perception of peers' pressure to drink and bragging about alcohol/drug use (Reis & Trockel, 2003) were associated with individual members' drinking behaviors. Differences in drinking as a function of characteristics of residence hall units have rarely been characterized. The emerging evidence for considerable variability in drinking among residents in different living units raises a question of whether selection and socialization processes account for those differences among

living units within a certain living type, in a similar way that those processes account for differences among living types.

Certain characteristics of on-campus living units may play a significant role in the selection and socialization processes. Regarding selection, motives for college attendance and cigarette use may be important determinants. Different motives for college attendance at precollege have been associated with risky drinking in the first year of college (Sher & Rutledge, 2007) and Greek affiliation (Park, Sher, & Krull, 2008). Similarly, for example, depending on the degrees of edification versus partying motives, students may differ in their preferences for residence hall units with quiet and limited visitation floors, even after taking account for precollege drinking. Depending on the degrees of a motive for extracurricular activities, students may selectively choose Greek houses with varied emphases on community service. In addition, cigarette use may affect the decision of living arrangement, given that smoking policy tends to considerably differ among living units. Regarding socialization, exaggerated perception of peers' typical drinking and dominant attitudes toward drinking (Borsari & Carey, 2001, 2003) and greater alcohol availability (Kuo, Wechsler, Greenberg, & Lee, 2003) have been associated with heavy drinking among college students. Recently, perceived peer drinking norms and alcohol availability were found to predict greater increases in risky drinking among Greek members than nonmembers at least in the early stage of college life (Park, Sher, Wood, & Krull, in press). These socio-cognitive and physical environmental factors may contribute to differential degrees of socialization among living units as well as living types. Group means of the precollege and college correlates among residents within each living unit can be used to characterize the environmental factors associated with residents' drinking.

The current study aimed to characterize self-selection and socialization processes occurring between on-campus living and risky drinking as a function of living types (living in residence halls vs. fraternity houses) and living units (specific units of residence halls and fraternity houses) during the college transition. Specifically, first, to test selection on a basis of precollege drinking, we examined whether risky drinking at precollege differed as a function of future living units and future Greek residence/affiliation status in college. Second, to explore potential mechanisms of self-selection other than precollege drinking, we examined the effects of group means of precollege correlates (i.e., cigarette use and college attendance motives) among residents of each living unit on differences of precollege drinking among future living units. Third, to test socialization among living types and units, we examined whether risky drinking in the first year of college differed as a function of concurrent Greek residence/affiliation status and living units, after controlling for precollege drinking. Finally, to explore potential mechanisms of socialization, we examined the effects of group means of college correlates (i.e., perceived peer drinking norms and alcohol availability) among residents of each living unit on differences in college drinking among concurrent living units.

Method

Participants

The data used in the present analyses were collected as part of a prospective study on alcohol and health behaviors. At the summer orientation session (June) preceding their matriculation, 3,720 (88%) of 4,226 incoming first-time first-year students at a large Midwestern university completed a paper-and-pencil questionnaire for the precollege assessment. This precollege sample was invited to participate in a web-based survey every fall (November/December) and spring (April/May) of the subsequent four years. Written parental consent was obtained for all participants under age 18, and assent/consent was obtained from each participant. All measures and procedures were reviewed and approved by the human subjects institutional review board.

The following inclusion criteria were used to select a sample for the present analyses: (1) participation in assessments at precollege and in the fall semester of the first year in college[1], and (2) residence of non-Greek members and sorority members in university residence halls and residence of fraternity members in fraternity houses. The vast majority of our sample lived on campus because university policy requires first-time college students younger than 20 years old to live on campus. Most fraternity members lived in fraternity houses because fraternity organizations at the university usually accept new members into fraternity houses in the first year of college. Most sorority members, however, lived in residence halls because sorority organizations do not accept new members into sorority houses until the sophomore year. Thus, from those who participated in the assessments both at precollege and in college (n = 2,553), we excluded people living off campus (n = 106), fraternity members living in residence halls (n = 42), and sorority members living in sorority houses (n = 12) or belonging to extramural sorority organizations (n = 1). As a result, the final sample (n = 2,392) consisted of non-Greek women in residence halls (n = 1,011), Greek women in residence halls (n = 475), non-Greek men in residence halls (n = 710), and Greek men in fraternity houses (n = 196). This final sample was 17.9 years of age (SD = 0.4) on average at the precollege baseline, and included more women (62%) than men. Participants were primarily Caucasian (90%), but also African American (5%), Asian (3%), Hispanic (2%) and Native American (0.4%).

Attrition analyses were conducted to compare the final sample to those who were not included in the current analyses (n = 1,328: 36% of the precollege sample) due to either non-participation in the college assessment (n = 1,167) or uncommon living arrangement types (n = 161). A multivariate logistic regression analysis, including demographic and precollege drinking variables, showed that attrition was significantly predicted by being male (odds ratio [OR] = 2.40; 95% confidence interval [CI] = 2.08, 2.78), being older (OR = 1.23; 95% CI = 1.01, 1.48), and having a higher frequency of having 12 or more drinks in the past 30 days at precollege, (OR = 1.13; 95% CI = 1.02, 1.27). The proportion of the variance of attrition accounted for by those precollege variables (as measured by Nagelkerke R^2; Nagelkerke, 1991) was 8%. This suggests that our findings may underestimate effects of risky drinking (and potentially Greek residence) among men.

Measures

On-campus living arrangements—Living arrangement was measured in the college assessment with the item "*Where do you live while attending school?*" Participants responded by choosing one of the following six options: residence hall, fraternity/sorority house, off-campus with family, off-campus with friends, off-campus alone, or off-campus with others. Participants who indicated that they lived in residence halls or fraternity/sorority houses were asked to indicate the specific unit in which they lived among 20 residence halls, 28 fraternity houses, and 19 sorority houses.

Fraternity/sorority affiliation—A dichotomous Greek status (1 = Greek member; 0 = nonmember) was determined from participants' responses in the college assessment regarding their degree of affiliation with a fraternity or sorority. Thirty two percent of women (475 of

[1]Although follow-up data have been obtained on this cohort on multiple measurement occasions, we chose to focus on the first college assessment to exploit the powerful methodology of clustered observations as a function of living units. Following the first semester, many students changed living units within on-campus living and some changed living types (e.g., from residence halls to Greek houses or off-campus living). Modeling data from individuals who change their living units across time involves fitting complexly cross-classified models, as opposed to the strictly nested models presented here. Estimation of cross-classified structures in a very large dataset is computationally intensive, which prevented us from incorporating data from subsequent assessments into the current analyses. Data of additional measurement points were used in another study using the same cohort data (Park, Sher, Wood, & Krull, in press); however, this previous study characterized mediating mechanisms underlying the relationship between risky drinking and Greek affiliation and thus, effects of different living types and units were not a focus of analyses.

1,486) and 22% of men (196 of 906) were classified as Greek. The Greek pledge process occurs prior to the first semester at the study university.

Risky drinking: Normative heavy drinking and extremely risky drinking—Two variables were administered to measure risky drinking in the assessments at precollege and in the first year of college: "In the past 30 days how many times have you had five or more drinks in a single sitting?" and "In the past 30 days how many times have you had twelve or more drinks in a single sitting?" Participants responded to each item based on 8-point ordinal scales, ranging from 0 (Didn't drink 5/12 or more drinks in the past 30 days), 1 (*Once in the past 30 days*), 2 (*2 to 3 times in the past 30 days*), 3 (*Once or twice a week*), 4 (*3 to 4 times a week*), 5 (*5 to 6 times a week*), 6 (*Nearly every day*), to 7 (*Every day*). Pearson product-moment correlations between these two items were .66 at precollege and .60 in the first year of college. An item measuring the frequency of having five or more drinks in a single sitting has been widely used for assessing high-risk drinking (e.g., national surveys including the Monitoring the Future Survey and the CORE Alcohol and Drug Survey: also see Carey, 2001). Due to the highly normative nature of heavy drinking among college students assessed with this traditional heavy drinking measure (e.g., more than 40% of college students engaged in heavy drinking at least once during the past two weeks; O'Malley & Johnston, 2002), an item measuring the frequency of having 12 or more drinks was included to assess a more extreme level of risky drinking. Although not often used in prior studies, the frequency of having 12 or more drinks in a single sitting has been shown to have good construct validity, as indicated by its positive associations with ownership of a fake identification card to obtain alcohol (Martinez, Sher, & Rutledge, 2007), the novelty seeking trait and fraternity/sorority affiliation (Park et al., in press), and drinking motives and alcohol consequences (Jackson & Sher, 2008).

College attendance motives—At the precollege assessment, 15 items were administered to measure reasons for attending college. Six group mean scores (each ranging from 1 to 4) among residents of each living unit were used for analyses: (1) party motive as the mean of two variables ($M = 3.06$, $SD = 0.32$; $\alpha = .64$) measuring importance of parties and having fun, (2) dating/mating motive as the mean of two variables ($M = 3.29$, $SD = 0.22$; $\alpha = .81$) measuring importance of meeting a boyfriend/girlfriend and finding a spouse, (3) edification motive as the mean of four variables ($M = 3.66$, $SD = 0.25$; $\alpha = .73$) measuring importance of learning, broadening perspectives, attaining feelings of accomplishment, and developing interpersonal skills, (4) career motive as the mean of two variables ($M = 1.86$, $SD = 0.30$; $\alpha = .70$) measuring importance of getting a more satisfying job and increasing earning potential, (5) sports motive as the mean of two variables ($M = 2.70$, $SD = 0.39$; $\alpha = .60$) measuring importance of athletics and sports events, and (6) extracurricular activity motive as the mean of three variables ($M = 1.98$, $SD = 0.24$; $\alpha = .41$) measuring importance of arts, political activism, and community service. Note that the internal consistency is not an appropriate psychometric index for of the extracurricular activity motive subscale because it comprises causal indicators (i.e., each item causes or determines a latent factor), rather than effect indicators (i.e., a latent factor causes or determines each item: Bollen & Lennox, 1991). Confirmatory factor analysis of the correlated six-factor model showed a reasonable fit to the data, $\chi^2(76, n = 2{,}254) = 929.92$, $p < .001$, Root Mean Square Error of Approximation = .07, Adjusted Goodness of Fit Index = .91, Comparative Fit Index = .89, considering that four out of the six subscales consist of only two items. Correlations among individual scores of these motives ranged from $r = -.05$ between career and extracurricular motives to $r = .36$ between party and sports motives, with a median correlation of $r = .12$. Correlations among group means at living unit level ranged from $r = -.25$ between party and extracurricular motives to $r = .74$ between party and sports motives, with a median correlation of $r = .18$.

Cigarette use—At the precollege assessment, the past-month frequency of cigarette use was measured based on a 0 (*I didn't smoke any cigarette in the past month*), 1 (*once or twice*), 2 (3 to 25 days a month) to 3 (*daily or almost daily*) scale. A group mean among residents of each living unit (M = 0.65, SD = 0.48) was used for the analyses.

Perceived peer drinking norms—At the college assessment, six items were administered to measure perception of close friends' drinking and feelings about drinking (adapted from Jessor & Jessor, 1977; α = .92) based on 0 – 4 scales: "How do most of your friends feel about drinking?", "How do most of your friends feel about getting drunk?", "How many of your close friends drink alcohol?", "How many of your close friends get drunk on a regular basis (at least once a month)?", "How many of your close friends drink primarily to get drunk?", and "When your close friends drink, how much (on average) does each person drink?" A group mean of the six items among residents of each living unit (M = 2.72, SD = 0.47) was used for the analyses.

Alcohol availability—At the college assessment, apparent alcohol availability was measured based on a 0 (*No*) – 1 (*Yes*) scale by five items assessing perceived ease of obtaining alcohol, having a fake ID to obtain alcohol, knowing a place to get alcohol without showing an identification card, obtaining alcohol from someone 21 or older, and keeping alcohol in living quarters. Note that the internal consistency is not an appropriate psychometric index for this scale, because it consists of causal indicators (Bollen & Lennox, 1991), same as the extracurricular activity college attendance motive subscale described earlier. Construct validity of this scale is indicated by its theoretically predictable association with other constructs (Cronbach & Meehl, 1955) in terms of strongly positive associations with the two risky drinking measures (r = .37 – .55) and Greek affiliation (r = .26). A group mean of the six items among residents of each living unit (M = 2.02, SD = 0.77) was used for the analyses.

Results

Descriptive Statistics of Key Study Variables

Means and standard deviations of the two drinking variables at precollege and in college as a function of gender and Greek affiliation are presented in Table 1. On average, students engaged in having five or more drinks in a single sitting (5 + drinks hereafter) roughly once and in having 12 or more drinks in a single sitting (12 + drinks hereafter) less than once for the past month at precollege. Frequencies of these two drinking behaviors slightly increased during the college transition regardless of gender and Greek affiliation. Product-moment correlations of the drinking variables with gender, Greek affiliation in women, and living types in men are also presented, which overall remained small to moderate over the college transition. However, there was a negligible association between future Greek affiliation and having 12 or more drinks at precollege among women, r = .04.

Multilevel Models

Data of college residence are hierarchical because each individual (Level 1) is nested within the particular living unit (Level 2) where he/she lives. Individuals living in the same living unit are more likely to be similar to each other than would be a random group of individuals (due to various reasons, including selection based on pre-existing individual differences and socialization through shared experiences). Failure to account for the association among observations in such hierarchical data results in downwardly biased standard errors and thus overly liberal significance tests (Barcikowski, 1981). We used multilevel models (Raudenbush & Bryk, 2002) because of their ability to account for dependency of observations inherent in hierarchical data.

Multilevel models also can estimate different components of the random error variance separately. First, random variance can be estimated as a function of different levels of the hierarchy: that is, variance among living units (Level 2 variance) and variance among individuals within living units (Level 1 variance). Second, variance among living units can be estimated separately for different types of living units. In this way, selection and socialization occurring among living units within each living type can be characterized. Living types, however, differed among men and women in our sample. There were two living types for men (i.e., residence halls and fraternity houses), whereas there was only one living type for women (i.e., residence halls). Thus, in models for men, random error variance was separately estimated into three components: variance among fraternity house units, variance among residence hall units, and variance among individuals within living units. In models for women, random error variance was separately estimated into two components: variance among residence halls and variance among individuals within residence halls.

Four sets of multilevel models were estimated: (1) models predicting precollege drinking in men, (2) models predicting precollege drinking in women, (3) models predicting college drinking in men, and (4) models predicting college drinking in women. Each set of models was estimated using the two drinking variables: past-month frequencies of 5 + drinks and 12 + drinks.

Models predicting precollege drinking in men—To characterize selection processes in men, three sets of multilevel models were estimated, using a hierarchical model building strategy (see Table 2). In the first set of models, living type (i.e., residence halls vs. fraternity houses) was included as a fixed effect. In the second and third sets of models, six motives for college attendance and the frequency of cigarette use, respectively, were added as fixed effects; they were included as living unit level variables to represent living environments which incoming students select into. In all models, residual variance after accounting for those predictors was separately estimated into three components as described earlier. Each set of models was estimated using the two drinking variables.

Future fraternity residents reported significantly higher frequencies of risky drinking at precollege than did future residence hall residents for both 5 + drinks ($\gamma = 1.01$, $p < .001$) and 12 + drinks ($\gamma = 0.52$, $p < .001$; see Table 2, first and fourth columns of data). This result suggested precollege risky drinkers' selection into the fraternity system. Even after controlling for the fraternity selection in general, there remained significant variance in precollege drinking among future college living units: both residence halls ($z = 0.09$, $p = .05$) and fraternity houses ($z = 0.54$, $p = .02$) for 5 + drinks and only fraternity houses ($z = 0.24$, $p = .02$) for 12 + drinks. This result suggested selection into specific college living units (beyond the mere fraternity selection) based on precollege drinking among men.

College attendance motives accounted for the selection into different living types, as indicated by the fact that a previously significant effect of living type became non-significant for both 5 + drinks ($\gamma = 0.56$, $p = .12$) and 12 + drinks ($\gamma = 0.26$, $p = .23$; see Table 2, second and fifth columns of data). However, those motives did not account for differential selection into specific living units, as indicated by no sizable changes in variance among residence halls and fraternity houses after those motives were included. Instead, cigarette use at precollege accounted for selection into different living units, as indicated by non-significant variance among both residence halls ($z = 0.04$, $p = .16$) and fraternity houses ($z = 0.30$, $p = .07$) for 5 + drinks and among fraternity houses ($z = 0.06$, $p = .17$) for 12 + drinks (see Table 2, third and sixth columns of data).

Models predicting precollege drinking in women—To characterize selection processes in women, three sets of multilevel models were estimated in the same ways as were

the aforementioned models for men with the following two exceptions. Because all women in our sample lived in residence halls regardless of their sorority affiliation, (1) sorority affiliation (instead of living type) was modeled and (2) random variance was separately estimated for variance among residence halls and variance among individuals within residence halls (but not variance among sorority houses).

As shown in Table 3, different results were found for the two drinking variables. For 5 + drinks, future sorority members reported a significantly higher frequency than did future non-sorority members ($\gamma = 0.48$, $p < .001$; see Table 3, first column of data), indicating selection into the sorority system based on precollege 5 + drinks. Even after controlling for the sorority selection in general, there remained significant variance in precollege 5 + drinks among future residence hall units ($z = 0.06$, $p = .02$), suggesting selection into specific residence halls (beyond the mere sorority selection) based on precollege 5 + drinks. College attendance motives accounted for the selection into specific residence halls, as indicated by the fact that a previously significant variance among residence halls became non-significant ($z = 0.01$, $p = .28$). Interestingly, there remained a significant effect of sorority affiliation ($\gamma = 0.44$, $p < .001$), even after taking account for college attendance motives and cigarette use. This result suggested robust selection into the sorority system based on precollege 5 + drinks, even after controlling for selection into specific residence halls based on college attendance motives and cigarette use. For 12 + drinks, there was no selection into the sorority system or specific residence hall units based on this extremely risky drinking in women, as indicated by a non-significant effect of sorority affiliation ($\gamma = 0.03$, $p = .23$) and non-significant variance among residence halls ($z = 0.001$, $p = .27$; see Table 3, fourth column of data).

Models predicting college drinking in men—To characterize socialization processes in men, two sets of multilevel models were estimated, using a hierarchical model building strategy (see Table 4). In the first set of models, main effects of living type and precollege drinking and their two-way interaction effect were included as fixed effects at the individual level. With precollege drinking as a predictor at the individual level in the models, outcome variables represented changes in drinking over the college transition (i.e., college drinking after controlling for precollege drinking). In the second set of models, main effects of perceived peer drinking norms and alcohol availability were added as fixed effects; they were included as living unit level variables to represent living environmental factors by which socialization occurred. In all models, residual variance after accounting for those predictors was separately estimated into three components, as in the precollege drinking models. Each set of models was estimated using the two drinking variables.

Different results were found for the two drinking variables. For 5 + drinks, there was a significant precollege drinking × living type interaction ($\gamma = -0.26$, $p < .001$; see Table 4, first column of data). Post-hoc analyses suggested that this interaction was largely due to greater socialization of living in fraternity houses among precollege non-heavy drinkers, as compared to precollege heavy drinkers. That is, among men whose precollege 5 + drinks equaled zero, fraternity residents showed a significantly higher frequency of 5 + drinks in college (1.70 [roughly twice per month]) than did non-Greek men (0.77 [less than once per month]; $\gamma = 0.83$, $p < .001$). However, among men with a higher frequency of precollege 5 + drinks (i.e., 1 *SD* above the mean), there was no significant difference as a function of living type in college 5 + drinks ($\gamma = 0.20$, $p = .13$). Precollege drinking, college living type, and their interaction accounted for variance in college 5+ drinks among college living units, as indicated by no estimable variance left among residence halls[2] and no significant variance among fraternity houses ($z = 0.10$, $p = .13$; see Table 4, first column of data). Even with peer norms and alcohol availability in the model, the precollege 5 + drinks × living type interaction remained significant ($\gamma = -0.28$, $p < .001$; see Table 4, second column of data). This result suggested robust

socialization of living in fraternity houses among non-heavy drinkers at precollege, even after controlling for peer norms and alcohol availability in living units.

For 12 + drinks, there was no differential socialization of college living type as a function of precollege drinking, indicated by non-significant precollege drinking × living type interaction ($\gamma = -0.08$, $p = .23$; see Table 4, third column of data). Regardless of precollege drinking levels, fraternity residents reported a higher frequency of 12 + drinks in college than did residence hall residents ($\gamma = 0.43$, $p = .001$). Even after taking account for precollege 12 + drinks, college living types, and their interaction, there remained a significant random variance in 12 + drinks among fraternity houses ($z = 0.13$, $p = .04$). This result suggested differential degrees of socialization among fraternity house units (but not among residence halls, $z = 0.01$, $p = .28$) in 12 + drinks. With peer norms and alcohol availability in the model, a main effect of living type ($\gamma = 0.19$, $p = .21$) and variance among fraternity houses became non-significant ($z = 0.10$, $p = .09$; see Table 4, fourth column of data). These results indicated that peer norms and alcohol availability accounted for greater socialization of fraternity residence in general and differential degrees of socialization among specific fraternity house units in college 12 + drinks (but not 5 + drinks).

Models predicting college drinking in women—To characterize socialization processes in women, two sets of multilevel models were estimated in the same ways as were the aforementioned models for men with the following two exceptions: (1) sorority affiliation (instead of living type) was modeled and (2) random variance was separately estimated into two components (i.e., variance among residence halls and variance among individuals within residence halls).

As shown in Table 5, first and third columns of data, there was no differential socialization of sorority affiliation as a function of precollege drinking, indicated by non-significant precollege drinking × sorority affiliation interaction for both 5 + drinks ($\gamma = 0.02$, $p = .72$) and 12 + drinks ($\gamma = -0.03$, $p = .62$). Regardless of precollege drinking levels, sorority members reported higher frequencies of risky drinking in college than did non-sorority members for both 5 + drinks ($\gamma = 0.27$, $p = .002$) and 12 + drinks ($\gamma = 0.09$, $p = .004$). Precollege drinking, sorority affiliation, and their interaction accounted for variance in college drinking among residence halls, as indicated by non-significant variance in 5 + drinks ($z = 0.003$, $p = .29$) and no estimable variance left in 12 + drinks. With peer norms and alcohol availability in the model, the main effect of sorority affiliation remained significant for both 5 + drinks ($\gamma = 0.24$, $p = .004$) and 12 + drinks ($\gamma = 0.08$, $p = .01$). This result indicated robust socialization of sorority affiliation in college risky drinking, even after controlling for peer norms and alcohol availability in residence hall units.

Discussion

Our findings extend previous literature by characterizing risky drinking as a function of living units during the college transition, over and above the association between college drinking and living types. Regarding residence halls, incoming students selected into specific residence hall units based on normative heavy drinking (i.e., having 5 or more drinks in a single sitting), but not extremely risky drinking (i.e., having 12 or more drinks in a single sitting), at precollege. However, there was no differential socialization in those drinking behaviors among residence hall units during the college transition. Regarding fraternity houses, incoming fraternity

[2]Because significance tests of residual variance in multilevel models tend to lack statistical power, no estimable residual variance due to living units after controlling for predictors does not necessarily mean that those predictors account for literally all of the variance in outcome variables. When the iterative estimation encounters a negative variance estimate, the residual variance is set to zero by default. However, in reality, this zero residual variance indicates a very small positive variance that is difficult to estimate.

members opted for specific fraternity house units based on both normative heavy drinking and extremely risky drinking. In turn, living in certain fraternity houses increased extremely risky drinking (but not normative heavy drinking) more than others. Living unit-level precollege correlates (i.e., college attendance motives and cigarette use) and college correlates (i.e., peer drinking norms and alcohol availability) accounted for most of the selection and socialization effects observed. Furthermore, our findings were based on a powerful methodology, including the use of a prospective design, a large and inclusive sample, and analyses that better address the multilevel nature of the data and missing data.

Selection into Specific Residence Halls and Fraternity Houses

The very strong effect of precollege drinking on selection into college living units highlights that students are not passive victims of the risky drinking college culture. Instead, incoming students appear to seek out environments (i.e., “niche seeking” [Scarr & McCartney, 1983]) that facilitate the continuation, indeed, escalation, of existing drinking behaviors (Park et al., in press). This selection process may contribute to considerable rank-order consistency in risky drinking across the college transition, despite dramatic life changes involved with college matriculation (Maggs & Schulenberg, 2005). Unfortunately, previous research on college drinking has not paid sufficient attention to the drinking patterns that student bring with them into college. For example, among national studies of college drinking, only one survey, *Monitoring The Future*, included prospective data on alcohol use at precollege. Given the strong selection processes into certain college environments, precollege baseline measurements would provide critical information for understanding college drinking.

Our finding of selection into specific non-Greek residence halls based on heavy drinking is striking. Although incoming students at the study university do not single out a residence hall to move in, housing assignment is based on their ranking order of preferences. The university provides information about residence halls' amenities such as availability of open-air smoking balconies, quiet floors, limited visitation floors and the proportion of first-year versus upper-class students. This information about a specific residence hall unit may differentially attract students with different levels of substance use and college attendance motives. However, this selection into specific residence halls appears much smaller than selection into specific fraternities. This is expected given that assignment to residence halls are more probabilistic than fraternity pledging process and that a certain residence hall may serve many different groups and interests (e.g., first year student interest groups). The selection effect into non-Greek living units is expected to be stronger when there are greater ranges of choices for students in types and units of living and people to live with. It also is noteworthy that there was selection into specific residence hall units based on normative heavy drinking but not on extremely risky drinking in both genders. This may be due to the relatively low frequency and variability of this extremely risky drinking at precollege among future residence hall residents.

In contrast, selection into specific fraternity house units (over and above selective Greek affiliation/residence among precollege risky drinkers) was based on extremely risky drinking as well as normative heavy drinking. We found that motives for college attendance accounted for selection into the fraternity system but not selection into specific fraternity houses. The drinking-based selection into specific fraternity houses was accounted for by cigarette use. This finding is consistent with the extant literature on the robust association between cigarette and alcohol use in emerging adulthood (Jackson, Sher, & Wood, 2000; Jackson, Sher, Cooper, & Wood, 2002). Cigarette use, and potentially other substance use, needs to be taken account for to better understand and intervene risky drinking on college campuses.

Differential Socialization among Fraternity Houses and Precollege Drinking Levels

Living in certain fraternity houses was associated with greater socialization in extremely risky drinking than living in other houses (above and beyond the overall Greek socialization). That is, it is in extremely heavy drinking where fraternities differentiate themselves from each other with respect to drinking behavior. However, no differential socialization in normative heavy drinking among residence halls and fraternity houses was found most likely because of the normativeness of this type of drinking among college students. Along with the finding of selection into fraternity houses based on extremely risky drinking, this finding underscores the need for incorporating measures of more extreme drinking behaviors to fully capture variability in hazardous aspects of fraternity drinking. A typically long duration of Greek affiliation/residence may facilitate generation of a culture specific to a certain organization/house (Larimer et al., 1997), which affects substance use behaviors that serve as a basis for selection and social rituals that sustain those behaviors over time. These socialization effects of the fraternity system in general and specific fraternity organizations were accounted for by living-unit level perceived peer drinking norms and alcohol availability. These findings indicate multiple mechanisms by which already high levels of risky drinking among fraternity members are maintained and further augmented over time (Park et al., in press).

Interestingly, individuals with a lower level of normative heavy drinking (but not extremely risky drinking) at precollege were more vulnerable to the detrimental effect of fraternity residence in the first year of college. In their retrospective study, Larimer et al. (2000) also found a significant interaction between living type (fraternity houses versus residence halls) and high school drinking on college drinking frequency among men. This result may reflect the process in which newly pledged Greek members who did not engage in heavy drinking at precollege assimilate rapidly into the Greek environment where heavy drinking practice is pervasive. Although most incoming fraternity members tend to have a heavy drinking history, infrequent heavy drinking members appear to be at high risk for rapid escalation of heavy drinking in the early stage of Greek life.

Potential Similarity across Gender in the Selection and Socialization Processes

Our findings suggested similar patterns of selection and socialization processes among specific residence hall units across men and women: (1) selection into specific residence hall units based on normative heavy drinking, but not based on extremely risky drinking, and (2) no differential socialization as a function of specific residence hall units in both normative heavy drinking and extremely risky drinking. However, because sorority members were not allowed to live in sorority houses in the first year of college at the study university, we could not test potential gender differences in socialization among specific Greek houses. Future studies with samples drawn from institutions where identical residence policies apply to men and women are needed to better characterize gender difference in socialization of Greek residence.

Clinical Implications

Our findings have significant implications for the development of prevention and intervention strategies aimed at curbing risky drinking on college campuses. Our findings of different risky drinking patterns as a function of living types and living units echo the importance of multi-level interventions targeting campus and community-wide environmental influences as well as individual factors (Task force of the National Advisory Council on Alcohol Abuse and Alcoholism, National Institutes of Health, 2002). Since college drinking is largely a function of precollege drinking, the importance of prevention efforts prior to and immediately after matriculation is highlighted. Universities may prevent incoming students from making residence decisions based on reasons related to drinking and partying, through highlighting interactive learning environments (e.g., residential learning communities; McCabe et al., 2007) and promoting parental involvement in the decision (e.g., Turrisi, Jaccard, Taki,

Dunnam, & Grimes, 2001). Preventive efforts should target precollege non-risky drinkers to prevent their being absorbed into risky drinking cultures in college, especially in the Greek system. Correcting often exaggerated perceived peer drinking norms (Perkins, 2002) and limiting access to alcohol through better enforcing age validation and controlling alcohol price, marketing, and outlet density near campuses (Toomey, Lenk, & Wagenaar, 2007) may be useful to dampen the strong socialization in the earliest stages of Greek life. Banning both alcohol and cigarette, as compared to banning only alcohol, in on-campus residence is recommended to reduce risky drinking problems (Toomey et al., 2007).

Limitations and Future Directions

Several limitations and future directions of the present study are worthy of mention. First, measurement of diverse characteristics of each living unit (e.g., reputation for party and academic activities, policy of alcohol and cigarette use and amenities of individual living units) would contribute to better characterization of multiple mechanisms underlying selection and socialization processes between college residence and risky drinking. Second, data from only one assessment point of precollege and college drinking were used for this study, which prevented the examination of the effect of college living arrangement on the longitudinal trajectories of drinking. Third, the current study focused on a single campus, which contains higher proportions of Caucasians and Greek members than the national averages. The nature of both selection and socialization effects are likely to vary across campuses with different types of student bodies, alcohol control policies, and the enforcement of those policies. Note, however, that these very limitations allowed us to characterize specific living unit effects beyond mere Greek affiliation effects; this would not be possible to examine with national data, which typically lack information regarding specific residence units. Fourth, we could not test an effect of off-campus living due to its small sample size and lack of information about detailed characteristics of off-campus living. It is challenging to appropriately model unit of socialization effects in off-campus living because socialization could differ as a function of living types (e.g., an apartment complex and a house) and relationship with roommates (e.g., parents/relatives, friends, or alone). Despite these limitations, this study meaningfully extends previous literature by characterizing the dynamic processes by which individuals opt into certain residential units that mesh with their pre-existing characteristics and, in turn, the residential environments affect individuals' subsequent drinking behaviors during the college transition.

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Table 1

Means (and Standard Deviations) of Risky Drinking Variables at Precollege and in the First Year of College as a Function of Gender and Greek Affiliation and Their Product-Moment Correlations with Gender, Greek Affiliation, and Living Type

		Past-month frequency of having 5 or more drinks in a single sitting		Past-month frequency of having 12 or more drinks in a single sitting	
		Precollege	**College**	**Precollege**	**College**
M(SD)	All participants (*n* = 2,392)	0.99 (1.41)	1.28 (1.41)	0.25 (0.73)	0.34 (0.83)
	Non-Greek men in residence halls (*n* = 710)	1.03 (1.46)	1.42 (1.49)	0.36 (0.90)	0.53 (1.02)
	Greek men in fraternity houses (*n* = 196)	2.15 (1.67)	2.40 (1.31)	0.95 (1.26)	1.24 (1.31)
	Non-Greek women in residence halls (*n* = 1,011)	0.63 (1.12)	0.85 (1.20)	0.09 (0.41)	0.11 (0.45)
	Greek women in residence halls (*n* = 475)	1.23 (1.47)	1.52 (1.41)	0.13 (0.46)	0.21 (0.56)
r	Gender[a] (*n* = 2,392)	.15***	.19***	.26***	.31***
	Living type in men[b] (*n* = 906)	.29***	.26***	.24***	.26***
	Greek status in women[c] (*n* = 1,486)	.22***	.24***	.04	.09***

Note.

[a] 0 = female; 1 = male.

[b] 0 = residence halls; 1 = fraternity houses.

[c] 0 = non-Greek member; 1 = Greek member.

*** $p < .001$.

Table 2

Multilevel Models Predicting Precollege Risky Drinking among Men

	Unstandardized estimate					
	Having 5 or more drinks			Having 12 or more drinks		
Fixed effects (γ)						
Intercept	1.04***	0.01	−1.18	0.36***	0.11	−0.96
Living type[a]	1.01***	0.56	0.48	0.52***	0.26	0.27
Party motive		1.78*	0.98		0.68	−0.04
Edification motive		0.33	−0.14		−0.0001	−0.17
Career motive		−0.33	0.36		−0.17	0.39
Dating/mating motive		−0.11	−0.68		−0.25	−0.56
Sports activity motive		−0.73	0.01		0.03	0.51
Extracurricular motive		−0.91	−0.42		−0.34	−0.08
Cigarette use			1.13**			0.84***
Random variance effects (z)						
Future residence halls	0.09*	0.09	0.04	0.01	0.01	0.001
Future fraternity houses	0.54*	0.48*	0.30	0.24*	0.25*	0.06
Individual residuals	2.12***	2.12***	2.12***	0.92***	0.93***	0.92***

Note. n = 879 – 880. Living type is an individual level predictor; college attendance motives and cigarette use are living unit level predictors.

[a] 0 = residence halls; 1 = fraternity houses.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Multilevel Models Predicting Precollege Risky Drinking among Women

	Unstandardized estimate					
	Having 5 or more drinks			Having 12 or more drinks		
Fixed effects (γ)						
Intercept	0.62***	−2.64	−1.39	0.09***	0.05	0.10
Sorority affiliation[a]	0.48***	0.45***	0.44***	0.03	0.02	0.02
Party motive		1.37*	0.30		0.28	0.24
Edification motive		0.72	0.22		0.04	0.03
Career motive		0.15	0.53		−0.06	−0.05
Dating/mating motive		−2.38**	−1.61		−0.35	−0.32
Sports activity motive		0.57	0.65		−0.02	−0.02
Extracurricular motive		−0.51	−0.41		−0.02	−0.01
Cigarette use			0.76			0.03
Random variance effects (z)						
Future residence halls	0.06*	0.01	0.01	0.001	-	-
Individual residuals	1.49***	1.48***	1.48***	0.18***	0.18***	0.18***

Note. n = 1,481 – 1,484. Sorority affiliation is an individual level predictor; college attendance motives and cigarette use are living unit level predictors. Dashes indicate there was no estimable random variance left after accounting for predictors.

[a] 0 = non-sorority; 1 = sorority.

* p<.05.

** p<.01.

*** p<.001.

Table 4

Multilevel Models Predicting College Risky Drinking among Men

	Unstandardized estimate			
	Having 5 or more drinks		Having 12 or more drinks	
Fixed effects (γ)				
Intercept	0.77***	−0.07***	0.30***	−0.30***
Precollege drinking	0.64***	0.63***	0.67***	0.66***
Living type[a]	0.83***	0.50*	0.43***	0.19
Precollege drinking × Living type	−0.26***	−0.28***	−0.08	−0.10
Peer drinking norms		0.19		0.12
Alcohol availability		0.26		0.20
Random variance effects (z)				
Residence halls	-	-	0.01	-
Fraternity houses	0.10	0.03	0.13*	0.10
Individual residuals	1.32***	1.32***	0.77***	0.77***

Note. n = 859 – 862. Living type and precollege drinking are individual level predictors; perceived peer drinking norms and alcohol availability are living unit level predictors. Dashes indicate there was no estimable random variance left after accounting for predictors.

**p<.01.

[a]0 = residence halls; 1 = fraternity houses.

*p<.05.

***p<.001.

Table 5

Multilevel Models Predicting College Risky Drinking among Women

	Unstandardized estimate			
	Having 5 or more drinks		Having 12 or more drinks	
Fixed effects (γ)				
Intercept	0.45***	−0.07	0.06***	0.08
Precollege drinking	0.62***	0.61***	0.45***	0.45***
Sorority affiliation[a]	0.27**	0.24**	0.09**	0.08*
Precollege drinking × Sorority	0.02	0.01	−0.03	−0.03
Peer drinking norms		−0.01		−0.18
Alcohol availability		0.35		0.26
Random variance effects (z)				
Residence halls	0.003	-	-	-
Individual residuals	0.97***	0.97***	0.20***	0.20***

Note. n = 1,465 – 1,468. Sorority affiliation and precollege drinking are individual level predictors; perceived peer drinking norms and alcohol availability are living unit level predictors. Dashes indicate there was no estimable random variance left after accounting for predictors.

[a] 0 = non-sorority; 1 = sorority.

* $p<.05$.

** $p<.01$.

*** $p<.001$.