

The Effect of Residence, School Status, Work Status, and Social Influence on the Prevalence of Alcohol Use Among Emerging Adults

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ABSTRACT. Objective: The first year after high school is a transitional year, with increased independence from parental supervision, contact with other independent youth, and exposure to new environments, all of which may influence substance use. This article reports longitudinal predictors of change in the prevalence of alcohol use and heavy episodic drinking among adolescents and environmental correlates (i.e., residence, college attendance, and work status) with drinking the year after high school. **Method:** A national sample of study participants ($N = 2,659$; 55% female) in the NEXT Generation Health Study were followed annually from 10th grade (Wave 1) to the year after high school (Wave 4). Longitudinal binary outcomes, including recent (30-day) drinking and two measures of heavy episodic drinking, were examined. Transition models with generalized estimating equations estimated the effect of previous drinking behaviors, social influences, and current resi-

dential status and activity (school and/or work) on drinking prevalence. **Results:** Drinking increased from 40.5% among high school seniors (Wave 3) to 53.5% in Wave 4 for 30-day use, and from 29.0% to 41.2% for heavy episodic drinking. Significant predictors of 30-day drinking included previous drinking status (odds ratio [OR] = 5.48), peer drinking often (OR = 3.25), parental expectations (OR = 0.91), and current year living on campus (OR = 2.10). The same significant predictors with similar magnitudes were found for both measures of heavy episodic drinking. Peer use did not interact with college attendance or residence. **Conclusions:** Predictors of drinking and heavy episodic drinking during the first year after high school included being White, living on campus, previous drinking, lower parental expectations, and having peers who drink. (*J. Stud. Alcohol Drugs*, 77, 121–132, 2016)

THE FIRST YEAR AFTER HIGH SCHOOL is transitional in numerous ways as many adolescents go to college, take jobs, and live away from home for the first time. Greater independence may afford greater exposure to drinking and opportunities to drink (Arnett, 2005). Drinking prevalence during late adolescence and emerging adulthood is of particular interest, given the high prevalence (Substance Abuse and Mental Health Services Administration [SAMHSA], 2011) and varied serious consequences (White & Hingson, 2013). The documented consequences of excessive alcohol consumption among college-age students include increased violence (both perpetration and victimization), injuries because of motor vehicle crashes and other causes,

poor school and work performance, cognitive deficits, and substance use disorders (White & Hingson, 2013). College students who report “getting drunk” just once in a typical week have a higher likelihood of being injured from falls and traffic crashes, and injuring others (O’Brien et al., 2006). Drinking is associated with an estimated 599,000 unintentional injuries, 646,000 assaults, 97,000 sexual assaults, and 1,800 deaths per year among college students (Hingson et al., 2009). College drinking is also associated with police involvement (Hingson et al., 2003; Presley & Pimentel, 2006; Wechsler et al., 2002), unsafe sex and drunk driving (Hingson et al., 2003), and poor academic performance (Presley & Pimentel, 2006; Wechsler et al., 2002). Although the consequences of excessive drinking among those who do not attend college immediately after high school may be just as severe (White & Hingson, 2013), most of the research has focused on students attending traditional 4-year colleges. This study examines the longitudinal predictors of the prevalence of alcohol use in a national sample of adolescents and the environmental correlates (i.e., residence, school, and work status) of drinking the first year after high school.

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Prevalence of alcohol use among emerging adults

The prevalence of drinking and heavy episodic drinking increases during high school (Johnston et al., 2013a) and

peaks among 18- to 25-year-olds (Johnston et al., 2012; SAMHSA, 2011). In 2013, drinking prevalence (30-day) was estimated to be 39.2% among high school seniors, 78% among 18- to 21-year-olds, and 86% among 22- to 26-year-olds (Johnston et al., 2014). Similarly, heavy episodic drinking (5 or more drinks on 5 or more occasions over the past 30 days) was 22% among high school seniors, 29.1% among 18- to 21-year-olds, and 43.8% among 22- to 26-year-olds (Johnston et al., 2013c). Among college students there appear to be distinct groups of users, with substantial proportions categorized as none/low, moderate, or high users (Chiauzzi et al., 2013; Cleveland et al., 2013; Maggs et al., 2011).

Although there is considerable research on drinking among full-time college students, there is less research on emerging adults who attend 2-year colleges or technical schools, or do not pursue higher education immediately after high school. A review of studies that examined factors associated with prevalence among college and noncollege youth concluded that college students drank more frequently and were at greater risk for alcohol problems than those not attending college (Carter et al., 2010). However, the variability in definitions of drinker status across studies makes it difficult to make direct comparisons of college and noncollege emerging adults. Most studies have compared emerging adults attending traditional colleges with those not attending college immediately following high school. For example, a recent Monitoring the Future analysis of those attending and those not attending 4-year colleges reported 30-day prevalence of 68% among full-time college students and 55% among others; heavy episodic drinking in the past 2 weeks was somewhat higher among those enrolled in college full time (35.2%) than among those not so enrolled (31.2%). Heavy episodic drinking among college men was particularly high (43.3%) compared with noncollege men (34.4%), but similar among college women (30.1%) and noncollege women (28.4%) (Johnston et al., 2013b).

College, residence, and work status

A recent review noted the lack of consensus in the literature reviewed of operational definitions of college and noncollege status, living situation, and work status (Carter et al., 2010). Comparisons of those who do or do not attend traditional 4-year colleges may not fully reflect the dynamic pattern of mobility and activity among emerging adults. After high school, some emerging adults continue to live at home, whereas others move to college or into the community. Of those who go directly to college after high school, not all live on campus. Some live at home and others live off campus in group or independent living environments. Many emerging adults who attend college also work. Work is nearly as common an activity as school for emerging adults.

According to government figures for 2013 (Bureau of Labor Statistics, 2014), 65.5% of recent (within the last year) high school graduates enrolled in college, about 60% in 4-year colleges and 40% in 2-year colleges. Of those not in college 74.2% worked, whereas 27.8% of students in 4-year colleges and 45.2% enrolled in 2-year colleges reported working. Both going to college and working provide opportunities for independence from parents and exposure to new peers, including older and independent peers, at an impressionable time in life (Arnett, 2005).

Research on college students has shown that drinking and heavy episodic drinking were higher among those exposed to "wet" environments. These include social, residential, and market surroundings in which drinking is prevalent and alcohol cheap and easily accessed, such as at university communities with bars that cater to students and other young people (Kuo et al., 2002; Nelson et al., 2005). The contribution of environment to drinking among emerging adults has been recognized conceptually (Toomey & Wagenaar, 2002; Toomey et al., 2007).

The literature on the relationship between drinking and work among emerging adults is surprisingly limited and focused mainly on college students. Cleveland et al. (2013) found that employed noncollege emerging adults were less likely to drink daily than nonworking students, whereas Leppel (2006) found that heavy drinking was lower among college students who worked. However, Butler et al. (2010) found that the number of hours college students worked was positively associated with number of drinks consumed daily and suggested that working increased stress among college students.

The implications of the many possible configurations of residence, school, and work status activity for drinking prevalence have not been well examined. Drinking prevalence among emerging adults could be expected to vary by environmental conditions as well as by social influence, and individual characteristics (e.g., sex, race/ethnicity, parental education, family structure, and possibly depression).

Peers and parents

Social influences from parents and peers have consistently been associated with drinking prevalence (White & Jackson, 2004/2005), including among emerging adults (Stone et al., 2012). Parenting behavior has been demonstrated to be associated with adolescent drinking behavior, even among college students (Schulenberg & Maggs, 2002), and positive parenting practices (e.g., responsiveness, monitoring, setting expectations for nonuse) have all been shown to be associated with delayed or reduced substance use (Avenevoli et al., 2005; Ryan et al., 2010). Theoretically, parents can influence drinking through modeling, access, and social influence, including norms and expectations about drinking, but this influence would be expected to decline during

emerging adulthood (Schulenberg & Maggs, 2002). Turning 18, leaving home, and working can all increase adolescents' independence from parents and provide opportunities to make new friends and experiment with alcohol and other drugs (Arnett, 2005).

College provides a dense concentration of emerging adults in environments that facilitate drinking and high availability of alcohol, with relative freedom from parental and other adult authority (Wechsler et al., 2002). At the same time, peer affiliation and lifestyle experimentation is thought to be dynamic during this period, regardless of college status (Arnett, 2005). It is logical to assume that emerging adults interested in drinking develop friendships with others with the same interest (selection) and drinking patterns similar to their peers (socialization). Peer drinking has consistently been related to adolescent alcohol use (D'Amico & McCarthy, 2006) and may work through social norms or direct social pressure to drink (Borsari & Carey, 2001; Brooks-Russell et al., 2014). Peer influence would be expected to be particularly strong during adolescence and emerging adulthood (Lamont et al., 2014; White & Jackson, 2004/2005). Because social influence is associated with drinking prevalence and may vary according to environmental circumstances, with peer influences potentially more intense in group living situations, it is of particular interest in this study in terms of its association with drinking and as a potential confounder of the association between drinking and environmental context.

Depressive symptoms

Although not always consistent, and probably bidirectional in nature, prior findings have shown associations over time between adolescent depressive symptoms and higher risk of substance use, dependence, and multiple-substance use (Fleming et al., 2008; Marmorstein et al., 2010; Sihvola et al., 2008; Stice et al., 1998). However, these associations are not well tested among emerging adults. Because the prevalence of depressive symptoms is thought to vary among older adolescents and young adults, it represents one potentially important measure of individual variability in alcohol use.

Current study and objectives

The NEXT Generation Health Study provided an unusual opportunity to examine drinking behaviors during the transition to early adulthood. The study included a national sample of adolescents recruited in the 10th grade and assessed annually through the first year after high school. The purpose of this research is to examine predictors of drinking and heavy episodic drinking among adolescents and environmental correlates with drinking the first year after high school.

Method

Sample

The NEXT Generation Health Study is a longitudinal study of a cohort of 10th-grade U.S. students using multi-stage sampling. Primary-sampling units consisted of school districts or groups of school districts stratified across the nine U.S. census divisions. Within this sampling framework, 80 schools out of 137 (58.4%) randomly selected schools agreed to participate starting in the 2009–2010 school year (Conway et al., 2013). Within each participating school, 10th-grade classes were randomly selected to participate; student assent and parental consent were obtained. These students were then surveyed annually, with a school-based assessment in the spring semester of 10th grade (Wave 1 [W1], 2010; $n = 2,524$), and web-based assessments in 11th grade (W2, 2011; $n = 2,439$), 12th grade (W3, 2013; $n = 2,407$), and the first year after high school (W4, 2013; $n = 2,177$). The protocol was approved by Institutional Review Board of the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

Measures (all waves unless otherwise indicated)

Alcohol use. Drinking prevalence was assessed with a question asking on how many occasions (if any) the student had consumed alcohol in the last 30 days (response options *never, 1–2, 3–5, etc., to 40 times or more*). Heavy episodic drinking was assessed as follows: “Think about the past 30 days. How many times have you had five (for boys)/four (for girls) drinks in a row on an occasion?” A separate question (2-hour heavy episodic drinking) asked, “Think about the past 30 days. How many times have you had had five (for boys)/four (for girls) drinks in a row within 2 hours (*1, 2, 3–5, 6–9, 10 or more*).” Variables were dichotomized as *never versus ever in the past 30 days*.

Demographic covariates. Baseline demographic variables included the following: gender; race/ethnicity (White, African American, Hispanic, other); family structure (two biological parents, biological parent and stepparent, single parent, other), and parental education as reported by the parent at W1 (high school or less, some college or technical school, bachelor's degree or higher).

Parenting practices (Waves 1, 2, 3). Perceived parental expectations for alcohol use were measured using items adapted from prior studies (Hartos et al., 2000; Hetherington, 1992). Participants were asked how important it is to their parents/guardians that they do not use alcohol. Response options ranged from 1 (*not at all*) to 7 (*extremely*). Parental monitoring-knowledge was assessed using questions adapted from a validated five-item scale (Brown et al., 1993). Adolescents reported their perceptions of their mother's and (on separate items) father's knowledge about their activities, in-

cluding who their friends were, how they spent their money, where they were after school, where they went at night, and what they did with their free time. Response options (1–4) included: *don't have/see father or mother/guardian, he/she doesn't know anything, he/she knows a little, and he/she knows a lot*. Higher scores reflect higher levels of parental monitoring-knowledge. Scores were averaged for each parent across the five items and then averaged across parents ($\alpha = .87, .88, \text{ and } .89$ for W1, W2, and W3, respectively).

Peer alcohol use. Participants were asked to think of their five closest friends and report the frequency that these friends drink alcohol. Response options (1–5) were *never, almost never, sometimes, often, and almost always*. Because of sparsity in some of the categories, we collapsed the variable to three levels, as follows: 1 = *never*; 2–3 = *almost never/sometimes*; 4–5 = *often/almost always*.

Depressive symptoms (Waves 2, 3, and 4). Respondents completed the Pediatric Depressive Symptoms Scale (Irwin et al., 2010), reporting how often they felt the following: unhappy, sad, lonely, alone, that life was bad, that everything went wrong, that I could not do anything right, and that I could not stop feeling bad. Response options (1–5) were *never, almost never, sometimes, often, and almost always*. Responses were averaged such that a higher score indicated more depressive symptoms (Dahlberg et al., 2005) ($\alpha = .94, .95, \text{ and } .96$ for W2, W3, and W4, respectively).

Residential status (Wave 4). Participants reported their current and previous residence in the past 12 months (parents' or guardians' home, own place, residence hall/dormitory, fraternity or sorority house, rented room or apartment, barracks in the armed services, social rehabilitation facility, communal home, physical rehabilitation facility, or homeless). Categories were combined to reflect living with their parents, on their own (own place, rented room), on campus (residence hall/dorm or a fraternity or sorority house), or other (those in the "other" category were too few to retain in these analyses). In a separate question, college students indicated living either on or off campus. Discrepant cases were resolved using previous residence (e.g., those who reported current residence as home and living on campus were classified as living on campus if their previous residence was a dormitory or fraternity/sorority house).

School status (Wave 4). Participants indicated that they did not attend school, or attended high school, technical or vocational school, community college, college or university, or graduate or professional school, and were asked to provide the name and location of the school. Preliminary analyses indicated that differences in alcohol consumption between those in technical school and those in community college were not significant, so those two categories were combined. The few students still in high school were dropped from the analysis, and no one reported being in graduate school. Therefore, three categories were used in the analysis: not attending school, attending

technical school/community college, and attending college/university.

Work status (Wave 4). Total hours per week spent working in paid and unpaid jobs was assessed using an item adapted from Monitoring the Future (Bachman et al., 1983). Response options were *0, 5 or less, 6–10, 11–15, 16–20, 21–25, 26–30, or more than 30 hours per week*. Working status was defined as *not working, working less than 20, 21–30, or more than 30 hours*.

Analysis

Among the total sample of 2,785 participants, 126 participants (those still in high school and those who reported as their residence barracks, hospital, living with family members other than their parents, and who were homeless) were excluded from this analysis, resulting in the analysis sample of 2,659 participants. Multiple imputation by chained equations (MICE) based on the assumption of missing at random (Little & Rubin, 2002; van Buuren & Groothuis-Oudshoorn, 2011) was used to impute missing subject and item nonresponse values in both outcome and independent variables. The algorithm recursively imputed each missing variable by estimating its distribution conditional on other variables. A total of 50 multiply imputed data sets were generated using R package "mice." Imputation essentially eliminates problems associated with loss to follow-up.

The focus of the analyses was on how drinking behavior changes over time and how these changes are explained by social and environmental risk factors. After descriptive statistics were calculated for each variable by wave, transition models (Diggle et al., 2002) were fitted to analyze the data ($N = 2,659$). Outcome variables at W2–W4 included past-30-day drinking, heavy episodic drinking, and 2-hour heavy episodic drinking and were analyzed separately. In general, the transition models assume that drinking behavior in the present is affected by drinking behavior in the past (lagged measure). For model simplicity and easy interpretation, we further made a "Markov assumption" (i.e., drinking in the current wave only depended on drinking in the immediate past wave, but not on the waves before). Therefore, we included the lagged measure in the model as a covariate. Other covariates from the previous wave included peer alcohol use, depressive symptoms, and parenting practice. These variables were treated as dichotomous, interval, or ordinal, consistent with the response distributions. Their coefficients reflect the average of the effects of that correlate at each wave on the subsequent wave drinking behavior (i.e., W1 on W2, W2 on W3, and W3 on W4). The environmental variables (school, residential and working status) were assessed at W4 and hence should only have direct effects on the W4 outcomes. To reflect this, we included the interaction terms between W4 and each of the environmental variables (without their main effects). In other words, the environ-

TABLE 1. Summary statistics for baseline demographic variables. Mean (*SE*) is reported for continuous variables and percentage (*SE*) is reported for categorical variables (*N* = 2,659)

Variable	Summary statistics
Age, in years	16.27 (0.03)
Gender, %	
Male	45.0 (1.6)
Female	55.0 (1.6)
Race/ethnicity, %	
White	56.5 (6.0)
African American	20.2 (4.5)
Hispanic	18.5 (3.7)
Other	4.8 (0.9)
Family structure, %	
Both biological parents	51.8 (2.1)
Biological & stepparent	19.3 (1.3)
Single parent	19.7 (1.7)
Other	9.2 (1.2)
Parental education, %	
High school or less	32.8 (2.9)
Some college	39.5 (1.7)
Bachelor's degree or higher	27.7 (2.9)

mental variables only enter the model as a predictor of W4 drinking outcomes, but not W1–W3 drinking outcomes. The coefficients are interpreted as the effect of the environment on W4 drinking. Demographic variables were also included as covariates. More details about the transition models are available online in a supplemental file that accompanies this article. The transition models were estimated using generalized estimating equations, implemented in SAS PROC GENMOD (SAS Institute Inc., Cary, NC). Features of complex survey design, including clustering and sampling weights, were taken into account. The analyses were repeated for each of the 50 imputed data sets and then the results were combined using Rubin's combination rule (Little & Rubin, 2002), implemented in SAS PROC MIANALYZE.

The main analysis included all three environmental variables (school, residential status, and working status) in the model (referred to as "full model"), which may result in over-adjusting. For example, those who live on campus must be attending schools, so adjusting for school status may lead to an attenuated estimation of the residential effect. Therefore, to see if their effects changed, we performed a sensitivity analysis by separately testing the environmental variables in the transition models (referred to as "Submodels 1, 2, and 3"). Last, to each of these submodels, we added the interactions between peer drinking and the environmental variable to test for possible effect of modification of peer influence by environment (i.e., how past-year peer influence carried over to the environment at W4).

Results

Weighted sample characteristics, shown in Table 1, indicate that 45% were male, and 56.5% were White, 20.2%

African American, and 18.5% Hispanic. The prevalence of drinking and values of the other covariates are shown in Table 2 for each wave. Ever drinking in the past 30 days—initially 35.6% at W1 (10th grade) and 35.5% at W2—increased to 40.5% at W3, and 53.5% at W4 (first year after high school). Heavy episodic drinking increased from 27.4% at W1 to 41.2% at W4, and 2-hour heavy episodic drinking increased from 23.8% at W1 to 34.5% at W4.

The W4 30-day drinking prevalence (Table 3) full model indicates lower prevalence for African American, Hispanic, and other compared with White participants, with higher use predicted by previous drinking (odds ratio [OR] = 5.48, 95% CI [4.21, 7.14]), parental expectations (OR = 0.91, 95% CI [0.87, 0.95]), friends who drink almost never/sometimes (OR = 1.67, 95% CI [1.38, 2.02]) and often/always (OR = 3.25, 95% CI [2.19, 4.83]), and living on campus compared with living at home (OR = 2.10, 95% CI [1.40, 3.15]). In each submodel, where one environmental variable was considered without inclusion of the other two, similar significant associations were found for the previously indicated predictors. In Submodel 1, no association was found for working compared with not working, although there was a trend toward lower drinking prevalence among those working 21–30 hours. In Submodel 2, residential status was considered, with higher prevalence among those living on campus versus at home (OR = 2.53, 95% CI [1.82, 3.53]) but no association for living on own compared with living at home (OR = 1.36, *n.s.*). In Submodel 3, drinking was less likely among those going to technical/community college (OR = 0.50, 95% CI [0.36, 0.71]) or not attending school (OR = 0.49, 95% CI [0.32, 0.73]) compared with those going to college/university.

Shown in Table 4 are transitional models for heavy episodic drinking, including the full model and submodels for work, residence, and school status. The full model indicates lower prevalence for African American, Hispanic, and other compared with White participants, with higher use predicted by previous drinking (OR = 6.10, 95% CI [4.75, 7.82]), parental expectations (OR = 0.90, 95% CI [0.86, 0.95]), friends who drink almost never/sometimes (OR = 1.90, 95% CI [1.49, 2.44]) and often/always (OR = 3.51, 95% CI [2.48, 4.97]), and living on campus compared with living at home (OR = 2.80, 95% CI [1.65, 4.74]). The pattern of associations in the submodels was the same as for drinking. In Submodel 1, there was no difference in prevalence for working compared with not working. In Submodel 2, there was lower prevalence for living on campus versus at home (OR = 2.76, 95% CI [1.87, 4.09]). In Submodel 3, there was lower prevalence for going to technical/community college (OR = 0.51, 95% CI [0.36, 0.73]) or not attending school (OR = 0.55, 95% CI [0.33, 0.92]) compared with going to college/university.

Transitional models for 2-hour heavy episodic drinking are shown in Table 5, including the full model and submodels for work, residence, and school status. The findings for

TABLE 2. Summary statistics for longitudinal outcomes and covariates. Mean (*SE*) is reported for continuous variables and percentage (*SE*) is reported for categorical variables

Variable	Range/labels	W1, %	W2, %	W3, %	W4, %
Drinking	No	64.4 (2.2)	64.5 (2.2)	59.5 (2.1)	46.5 (2.2)
	Yes	35.6 (2.2)	35.5 (2.2)	40.5 (2.1)	53.5 (2.2)
Heavy episodic drinking	No	72.6 (1.9)	74.9 (2.4)	71.0 (2.1)	58.8 (2.4)
	Yes	27.4 (1.9)	25.1 (2.4)	29.0 (2.1)	41.2 (2.4)
2-hour heavy episodic drinking	No	76.2 (1.8)	78.4 (2.2)	76.3 (2.2)	65.5 (2.3)
	Yes	23.8 (1.8)	21.6 (2.2)	23.7 (2.2)	34.5 (2.3)
Depressive symptoms	1–5	2.34 (0.03)	2.08 (0.03)	2.03 (0.05)	2.01 (0.04)
	Never	64.4 (2.2)	66.6 (1.8)	62.7 (2.3)	54.2 (2.5)
5 friends drinking	Almost never/sometimes	25.0 (1.3)	23.3 (1.4)	25.4 (1.5)	30.5 (2.0)
	Often/always	10.6 (1.2)	10.1 (1.3)	11.9 (1.7)	15.3 (1.9)
Parental knowledge	1–4	2.35 (0.02)	2.32 (0.02)	2.30 (0.03)	–
Parental expectations	1–7	5.85 (0.07)	5.66 (0.08)	5.49 (0.09)	–
Working status	Not working	–	–	–	50.3 (2.6)
	20 hours or less	–	–	–	20.4 (1.8)
	21–30 hours	–	–	–	13.8 (1.2)
	>30 hours	–	–	–	15.4 (1.6)
Residential status	Parent's home	–	–	–	56.1 (2.3)
	On campus	–	–	–	15.7 (1.5)
	Own place	–	–	–	28.2 (2.2)
School status	Not attending	–	–	–	27.2 (1.9)
	Technical school/ community college	–	–	–	28.9 (1.7)
	College/university	–	–	–	43.9 (2.4)

Note: W = wave.

the full and submodels were nearly identical to those for heavy episodic drinking, with little difference in the magnitude of the associations.

For each of the submodels, we examined interactions between peer influence and the environmental variable, with no significant findings. This suggests that peer influence and environmental influence act as independent, additive risk factors to the transition probabilities of drinking.

Discussion

Although there is ample research on the prevalence and predictors of alcohol use among high school and college students, there is less research on the variability in prevalence among emerging adults according to location and activity (Carter et al., 2010). The NEXT Generation Health Study enabled examination of predictors of alcohol use prevalence longitudinally from 10th grade through the first year after high school among participants who enrolled and those who did not enroll in postsecondary education. The prevalence for 30-day alcohol use (54%) and heavy episodic drinking (41%) in our sample the first year after high school was somewhat different than other reports; for example, prevalence was 78% and 29.1% for a sample of 19- to 21-year-olds in the Monitoring the Future survey (Johnston et al., 2013b), and 43.8% and 29.1% for 18- to 20-year-olds in the 2013 National Survey on Drug Use and Health (SAMHSA, 2014). Differences in these national surveys in 30-day drinking prevalence are probably

attributable to key design differences, including the age of the participants and measures. Our sample was somewhat younger than the other samples, particularly those in Monitoring the Future, which include a large proportion of 21-year-olds eligible to drink legally. With respect to heavy drinking, the questions varied across the three studies. We asked our sample about having at least 4 (for women) and 5 (for men) drinks on an occasion in the last 30 days, whereas Monitoring the Future asked about 5 drinks in the last 2 weeks, hence, a lower prevalence; and the SAMHSA survey asked about 5 drinks on one occasion on at least 5 of the last 30 days, hence a lower prevalence. We found lower drinking prevalence among African Americans and Hispanics relative to Whites, and women were less likely than men to report heavy episodic drinking, consistent with previous reports (Hingson & White, 2013).

Two nonsignificant findings are notable. First, we did not find significant associations between depressive symptoms and drinking, in contrast to other studies (Fleming et al., 2008; Marmorstein et al., 2010; Sihvola et al., 2008; Stice et al., 1998). Second, we found no association between work status and drinking, despite the increased independence from parents and greater exposure to peers in work settings. Work environments, particularly full-time employment, may require additional responsibility and time demands that reduce the likelihood of drinking.

Previous drinking, peer use, and parental expectations predicted drinking and heavy drinking status. Previous drinking is logically linked to future use and has frequently been

TABLE 3. Transition models of the cumulative effect of each variable at the previous wave on Wave 4 drinking with submodels for work, residence, and school status

Variable	30-day drinking as the outcome			
	Full model OR [95% CI]	Submodel 1 ^a OR [95% CI]	Submodel 2 ^a OR [95% CI]	Submodel 3 ^a OR [95% CI]
Gender				
Male (ref.)				
Female	0.88 [0.74, 1.03]	0.89 [0.76, 1.05]	0.87 [0.74, 1.03]	0.88 [0.75, 1.04]
Race/ethnicity				
White (ref.)				
African American	0.68 [0.51, 0.89]**	0.67 [0.50, 0.89]**	0.67 [0.51, 0.88]**	0.67 [0.51, 0.89]**
Hispanic	0.73 [0.58, 0.91]**	0.70 [0.55, 0.89]**	0.72 [0.57, 0.90]**	0.71 [0.57, 0.89]**
Other	0.76 [0.37, 1.57]	0.75 [0.36, 1.52]	0.76 [0.37, 1.56]	0.74 [0.36, 1.54]
Family structure				
Both biological parents (ref.)				
Biological and stepparent	1.06 [0.82, 1.37]	1.05 [0.82, 1.35]	1.05 [0.81, 1.36]	1.07 [0.83, 1.37]
Single parent	1.03 [0.82, 1.30]	1.03 [0.82, 1.29]	1.02 [0.81, 1.29]	1.03 [0.81, 1.30]
Other	1.08 [0.80, 1.44]	1.05 [0.77, 1.43]	1.06 [0.78, 1.42]	1.08 [0.81, 1.44]
Parental education				
High school or less (ref.)				
Some college	1.01 [0.83, 1.25]	1.03 [0.84, 1.27]	1.02 [0.83, 1.26]	1.01 [0.82, 1.25]
Bachelor's degree or higher	1.03 [0.81, 1.30]	1.11 [0.87, 1.41]	1.04 [0.82, 1.32]	1.04 [0.82, 1.32]
Alcohol use in previous wave				
No (ref.)				
Yes	5.48 [4.21, 7.14]***	5.41 [4.15, 7.04]***	5.43 [4.16, 7.09]***	5.52 [4.25, 7.17]***
Wave				
2 (ref.)				
3	1.34 [1.10, 1.63]**	1.34 [1.10, 1.62]**	1.34 [1.10, 1.62]**	1.34 [1.10, 1.63]**
4	2.04 [1.31, 3.16]***	2.36 [1.79, 3.11]***	1.73 [1.39, 2.14]***	3.48 [2.55, 4.74]***
Depressive symptoms, previous				
Parental knowledge, previous	1.08 [0.97, 1.19]	1.07 [0.97, 1.17]	1.07 [0.97, 1.19]	1.07 [0.97, 1.18]
Parental expectations, previous	0.93 [0.77, 1.13]	0.93 [0.77, 1.13]	0.93 [0.77, 1.13]	0.93 [0.77, 1.13]
5 friends drinking, previous	0.91 [0.87, 0.95]***	0.92 [0.88, 0.96]***	0.91 [0.87, 0.95]***	0.91 [0.87, 0.95]***
Working status at Wave 4				
Never (ref.)				
Almost never/sometimes	1.67 [1.38, 2.02]***	1.71 [1.41, 2.06]***	1.69 [1.40, 2.03]***	1.69 [1.40, 2.03]***
Often/always	3.25 [2.19, 4.83]***	3.31 [2.23, 4.92]***	3.26 [2.19, 4.84]***	3.26 [2.20, 4.84]***
Residential status at Wave 4				
Not working (ref.)				
20 hours or less weekly	1.13 [0.69, 1.85]	1.06 [0.66, 1.70]	–	–
21–30 hours weekly	1.16 [0.80, 1.68]	0.84 [0.59, 1.19]	–	–
>30 hours weekly	1.48 [0.95, 2.33]	1.01 [0.63, 1.61]	–	–
Residential status at Wave 4				
Home (ref.)				
On campus	2.10 [1.40, 3.15]***	–	2.53 [1.82, 3.53]***	–
Own place	1.30 [0.93, 1.83]	–	1.36 [0.96, 1.93]	–
School status at Wave 4				
College/university (ref.)				
Technical school/community college	0.73 [0.48, 1.10]	–	–	0.50 [0.36, 0.71]***
Not attending	0.65 [0.40, 1.06]	–	–	0.49 [0.32, 0.73]***

Notes: Ref. = referent. ^aEach submodel includes only one environmental variable, without inclusion or adjustment for the other environmental variables.

** $p < .01$; *** $p < .001$.

reported as a predictor (Martinez et al., 2014). The following parenting behaviors have been found to be negatively associated with drinking in college samples: parental limits (Varvil-Weld et al., 2014), disapproval of heavy drinking (Walls et al., 2009), sustained communication about college drinking (Cleveland et al., 2012; Turrisi & Ray, 2010), and maternal warmth and supervision (Cleveland et al., 2014), whereas parental permissiveness may increase college drinking and problems (Walls et al., 2009). In our sample, both parental knowledge and parental expectations were negatively associated with 30-day use and heavy episodic drink-

ing, and the ORs were equivalent or lower for knowledge compared with expectations; when we placed both variables in the model, only expectations was significantly associated, if modestly. Although parenting knowledge reflects involvement and communication, the establishment of parental expectations about drinking may be particularly important during the transition to independence from parents during emerging adulthood (Turrisi & Ray, 2010). Surprisingly, our examination of variation in associations between drinking and parenting expectations indicated no significant decline over time, consistent with the contention that the effects of

TABLE 4. Transitional models for heavy episodic drinking, including the full model and the submodels for work, residence, and school status

Variable	Heavy episodic drinking as the outcome			
	Full model OR [95% CI]	Submodel 1 ^a OR [95% CI]	Submodel 2 ^a OR [95% CI]	Submodel 3 ^a OR [95% CI]
Gender				
Male (ref.)				
Female	0.76 [0.61, 0.94]**	0.78 [0.63, 0.96]*	0.76 [0.62, 0.94]**	0.77 [0.63, 0.96]**
Race/ethnicity				
White (ref.)				
African American	0.58 [0.42, 0.81]***	0.58 [0.42, 0.81]***	0.57 [0.41, 0.80]***	0.58 [0.41, 0.82]**
Hispanic	0.79 [0.62, 1.00]	0.76 [0.60, 0.96]**	0.78 [0.61, 0.99]*	0.77 [0.61, 0.98]*
Other	0.71 [0.31, 1.65]	0.69 [0.30, 1.58]	0.71 [0.31, 1.63]	0.69 [0.30, 1.60]
Family structure				
Both biological parents (ref.)				
Biological and stepparent	0.96 [0.71, 1.30]	0.96 [0.71, 1.30]	0.96 [0.71, 1.30]	0.97 [0.72, 1.30]
Single parent	0.92 [0.69, 1.23]	0.92 [0.69, 1.22]	0.92 [0.69, 1.22]	0.92 [0.69, 1.22]
Other	1.14 [0.81, 1.61]	1.12 [0.78, 1.60]	1.13 [0.79, 1.61]	1.14 [0.81, 1.61]
Parental education				
High school or less (ref.)				
Some college	0.97 [0.77, 1.23]	0.99 [0.79, 1.23]	0.98 [0.78, 1.23]	0.98 [0.77, 1.23]
Bachelor's degree or higher	1.06 [0.81, 1.39]	1.15 [0.90, 1.48]	1.07 [0.82, 1.39]	1.09 [0.83, 1.43]
Alcohol use in previous wave				
No (ref.)				
Yes	6.10 [4.75, 7.82]***	6.04 [4.71, 7.74]***	6.06 [4.73, 7.78]***	6.09 [4.77, 7.76]**
Wave				
2 (ref.)				
3	1.41 [1.02, 1.93]*	1.40 [1.02, 1.93]	1.41 [1.02, 1.93]*	1.41 [1.02, 1.93]*
4	1.65 [0.95, 2.88]	2.48 [1.71, 3.60]	1.82 [1.37, 2.42]***	3.60 [2.67, 4.87]***
Depressive symptoms, previous				
Parental knowledge, previous	1.09 [0.96, 1.23]	1.08 [0.96, 1.20]	1.08 [0.96, 1.23]	1.08 [0.96, 1.22]
Parental expectations, previous	0.88 [0.69, 1.12]	0.88 [0.69, 1.13]	0.88 [0.68, 1.12]	0.88 [0.69, 1.13]
5 friends' drinking, previous	0.90 [0.86, 0.95]***	0.91 [0.86, 0.96]***	0.90 [0.86, 0.95]***	0.90 [0.86, 0.95]***
Never (ref.)				
Almost never/sometimes	1.90 [1.49, 2.44]***	1.95 [1.54, 2.48]***	1.92 [1.52, 2.44]***	1.93 [1.52, 2.46]***
Often/always	3.51 [2.48, 4.97]***	3.56 [2.52, 5.05]***	3.50 [2.47, 4.94]***	3.53 [2.49, 5.00]***
Working status at Wave 4				
Not working (ref.)				
20 hours or less	1.41 [0.80, 2.49]	1.30 [0.75, 2.24]	–	–
21–30 hours	1.03 [0.61, 1.76]	0.73 [0.45, 1.19]	–	–
>30 hours	1.56 [0.88, 2.77]	1.07 [0.61, 1.88]	–	–
Residential status at Wave 4				
Home (ref.)				
On campus	2.80 [1.65, 4.74]***	–	2.76 [1.87, 4.09]***	–
Own place	1.24 [0.83, 1.85]	–	1.27 [0.84, 1.91]	–
School status at Wave 4				
College/university (ref.)				
Technical school/community college	0.91 [0.56, 1.49]	–	–	0.51 [0.36, 0.73]***
Not attending	0.92 [0.50, 1.69]	–	–	0.55 [0.33, 0.92]*

Notes: Ref. = referent. ^aEach submodel includes only one environmental variable, without inclusion or adjustment for the other environmental variables.

* $p < .05$; ** $p < .01$; *** $p < .001$.

parenting behaviors during adolescence contribute to behavior at least through the year after college (Turrissi & Ray, 2010).

Peer use has consistently been associated with adolescent and emerging adult drinking (Brooks-Russell et al., 2014; Mallett et al., 2013; Pandina et al., 2010; Stone et al., 2012). Our study adds to the literature estimates of risk because of peer affiliation over time. For example, the adjusted OR of 3.25 for friends drinking calculated by transitional analyses represents the cumulative average increased risk (3.25 times greater risk of drinking) associated with peer drinking when

W1 peer drinking was regressed on W2 adolescent drinking, W2 peer drinking was regressed on W3 adolescent drinking, and W3 peer drinking was regressed on W4 emerging adult drinking.

In particular, we examined the variability in prevalence by residence, work, and school attendance the first year after high school. Consistent with previous research, we found that college attendance, and more specifically living on campus, was a significant predictor of alcohol use (Johnston et al., 2013b; Weitzman et al., 2003; White & Hingson, 2013). This is somewhat different from the conclusion of Carter et

TABLE 5. Transitional models for 2-hour heavy episodic drinking, including the full model and submodels for work, residence, and school status

Variable	2-hour heavy episodic drinking as the outcome			
	Full model OR [95% CI]	Submodel 1 ^a OR [95% CI]	Submodel 2 ^a OR [95% CI]	Submodel 3 ^a OR [95% CI]
Gender				
Male (ref.)				
Female	0.71 [0.58, 0.88]**	0.74 [0.60, 0.91]**	0.72 [0.58, 0.88]***	0.73 [0.59, 0.89]**
Race/ethnicity				
White (ref.)				
African American	0.65 [0.47, 0.91]**	0.65 [0.46, 0.91]**	0.64 [0.46, 0.89]**	0.65 [0.46, 0.92]**
Hispanic	0.81 [0.61, 1.08]	0.78 [0.58, 1.04]	0.81 [0.61, 1.07]	0.80 [0.61, 1.05]
Other	0.91 [0.40, 2.09]	0.88 [0.39, 1.98]	0.90 [0.40, 2.05]	0.89 [0.39, 2.02]
Family structure				
Both biological parents (ref.)				
Biological and stepparent	0.95 [0.71, 1.27]	0.95 [0.72, 1.27]	0.95 [0.71, 1.26]	0.96 [0.73, 1.27]
Single parent	0.86 [0.64, 1.14]	0.85 [0.64, 1.13]	0.85 [0.64, 1.13]	0.85 [0.64, 1.13]
Other	1.01 [0.73, 1.40]	0.99 [0.70, 1.38]	0.99 [0.72, 1.38]	1.01 [0.73, 1.40]
Parental education				
High school or less (ref.)				
Some college	1.07 [0.84, 1.34]	1.08 [0.86, 1.36]	1.07 [0.85, 1.36]	1.07 [0.84, 1.35]
Bachelor's degree or higher	1.10 [0.84, 1.43]	1.19 [0.92, 1.55]	1.11 [0.85, 1.44]	1.13 [0.86, 1.48]
Alcohol use in previous wave				
No (ref.)				
Yes	5.54 [4.00, 7.66]***	5.53 [3.99, 7.66]***	5.54 [4.02, 7.63]***	5.58 [4.07, 7.64]***
Wave				
2 (ref.)				
3	1.25 [0.96, 1.61]	1.24 [0.96, 1.60]	1.24 [0.96, 1.61]	1.24 [0.96, 1.61]
4	1.56 [0.94, 2.59]	2.27 [1.58, 3.28]***	1.64 [1.19, 2.26]**	3.19 [2.37, 4.31]***
Depressive symptoms, previous	1.10 [0.98, 1.24]	1.09 [0.98, 1.21]	1.10 [0.98, 1.23]	1.10 [0.98, 1.23]
Parental knowledge, previous	0.84 [0.69, 1.03]	0.85 [0.69, 1.04]	0.84 [0.69, 1.03]	0.85 [0.69, 1.04]
Parental expectations, previous	0.91 [0.87, 0.96]***	0.92 [0.87, 0.97]**	0.91 [0.87, 0.96]***	0.91 [0.87, 0.97]***
5 friends' drinking, previous				
Never (ref.)				
Almost never/sometimes	2.04 [1.58, 2.63]***	2.10 [1.63, 2.70]***	2.07 [1.62, 2.64]***	2.08 [1.62, 2.66]***
Often/always	3.69 [2.65, 5.12]***	3.74 [2.69, 5.21]***	3.67 [2.64, 5.09]***	3.70 [2.66, 5.14]***
Working status at Wave 4				
Not working (ref.)				
20 hours or less	1.32 [0.64, 2.71]	1.24 [0.63, 2.45]	–	–
21–30 hours	0.87 [0.50, 1.52]	0.63 [0.37, 1.05]	–	–
>30 hours	1.69 [0.97, 2.93]	1.11 [0.65, 1.90]	–	–
Residential status at Wave 4				
Home (ref.)				
On campus	2.59 [1.58, 4.24]***	–	2.63 [1.76, 3.92]***	–
Own place	1.21 [0.81, 1.81]	–	1.25 [0.83, 1.87]	–
School status at Wave 4				
College/university (ref.)				
Technical school/community college	0.96 [0.61, 1.51]	–	–	0.56 [0.39, 0.81]***
Not attending	0.82 [0.43, 1.55]	–	–	0.52 [0.30, 0.92]*

Notes: Ref. = referent. ^aEach submodel includes only one environmental variable, without inclusion or adjustment for the other environmental variables.

* $p < .05$; ** $p < .01$; *** $p < .001$.

al. (2010) that drinking quantity was higher among college students living away from home. In our sample, when examined simultaneously, living on campus, but not school status, predicted alcohol use; when residential and work status were removed from the model, attending a 4-year college doubled the risk for drinking and heavy episodic drinking. It is interesting to note that living away from parents but only on campus was significantly associated with alcohol use, suggesting that it may not be the move away from home, with its attendant increase in independence, but something unique to

campus living (e.g., increased availability and social norms favorable to drinking) that may have contributed to increased consumption.

Our findings provide new evidence about the importance of environment in relation to drinking among emerging adults. We report that previous substance use, peer drinking, and parental expectations were associated with drinking, consistent with many other studies that have emphasized the enduring importance of previous behavior and social influence. In addition, we report that living on

campus the year after high school is associated with drinking and heavy drinking, controlling for previous drinking, social influences, depression, and demographic factors. Our findings are consistent with the contention that the concentration of young adults in an environment with little adult supervision and permissive drinking norms, presumably with easy access to alcohol, contributes to drinking prevalence.

Strengths and limitations

The strengths of the research include a relatively large, nationally representative sample of adolescents surveyed longitudinally over 4 years, with data on parenting behaviors, peer use, and residential, work, and college status the first year after high school. The study includes emerging adults who do not attend college immediately after high school, or who opt to attend community college or technical schools, groups that have infrequently been followed. However, several study limitations should be noted. The substance use measures were self-reported and assessed annually. More frequent assessments would be informative. The study included two measures of heavy episodic drinking but did not separately assess extreme heavy episodic drinking, which is known to be common among college-age youth and has an increased likelihood of serious consequences (Cleveland et al., 2013; Mallett et al., 2013; White & Hingson, 2013). We examined only the dichotomized outcome of drinking because some levels of frequent drinking had sparse responses. Therefore, the transition probabilities and their correlates are only for the transition from not drinking to drinking, whereas the severity/frequency of drinking was left for future exploration. The peer and parental factors were self-reported, thereby introducing the potential for reporting bias. Participants' perceptions of peers and parents may have an important influence on their behavior (Brooks-Russell et al., 2014), reflecting social norms if not direct influence. Future research that includes peer and parental reports of their own behavior in addition to participants' perceptions would add to our understanding of these influences. Third, not all possible risk factors were examined. For example, we were not able to include externalizing behaviors, personality, or drinking expectancies, which have been linked to use in previous research (Avenevoli et al., 2005).

Conclusions

The study findings highlight the increased risk for drinking and heavy episodic drinking among emerging adults, particularly among those who are White, attend a 4-year college and live on campus, previously drank, are affiliated with peers who drink, and have lower parental expectations for not drinking.

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