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College-going and Trajectories of Drinking from Adolescence into Adulthood

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Abstract

To explore an exception to the association between educational attainment and health, this study unpacked variability in the drinking of U.S. college students by applying life course concepts to analyses of the National Longitudinal Study of Adolescent Health (Add Health). Growth curve models showed that youth who graduated from four-year colleges before turning 25 without later reentering higher education had the highest peaks in drinking after adolescence and the shallowest declines into their 30s. Deviations from this pathway in terms of type, timing, and order of college transitions flattened out drinking trajectories from adolescence into adulthood. Expectations that more alignment between precollege and college social contexts (defined by family backgrounds, high school academic performance, and peer norms) would predict the most problematic drinking trajectories among young four-year college-goers were not supported. Instead, youth who appeared headed for the early four-year college pathway but did not make it there had problematic drinking trajectories.

Keywords

adolescents; college; drinking; young adulthood

The rise in alcohol use between adolescence and young adulthood in the United States is a public health concern. Not only does this rise pose health risks in the short term, but it can have serious consequences for lifelong health if it continues into adulthood. Thus, better understanding alcohol use during this period of the life course can shed light on much longer health trajectories (Bachman et al. 2008; Schulenberg and Maggs 2002). Policy makers, educators, and the public have long focused on college-going as key to this problematic uptick in drinking during the late teens through early 20s. This attention has been fueled by statistics that nearly 2,000 college students die each year from alcohol-related accidents and suicides and that millions more suffer from one or more serious alcohol-related threats to physical and mental well-being, such as injuries and sexual assault (National Institute of Alcohol Abuse and Alcoholism 2015; Weitzman, Nelson, and Wechsler 2003). Medical sociologists can inform this public debate by elucidating the complexity within the

association between college-going and drinking to identify for whom, when, and where this association is strongest and weakest.

Drawing on life course theory (Crosnoe and Johnson 2011) and the sociological literature linking education to health (Mirowsky and Ross 2003), this study attempts such an elucidation. It situates alcohol use within the nexus of changing social contexts and developmental capacities that characterize the transition into young adulthood in general and the transition into college in particular. In the process, we offer an explanation for why the drinking of young college students is an exception to the health benefits of educational attainment over the life course. We also hypothesize about how variability in the ways that young people transition into and through college may moderate the degree to which college-going leads to drinking from adolescence into young adulthood. These hypotheses are pursued by estimating growth curves on data from four waves in the National Longitudinal Study of Adolescent Health (Add Health). This research has practical significance in that it can inform intervention efforts to reduce the public health harm of drinking during the early life course by identifying critical groups and periods to be targeted. It has theoretical significance by conceptualizing various components of education as differentially health-relevant and reconciling how specific stages of the life course seem to “defy” general life course trends in the connection between education and health.

Background

Education, Health, and the Paradox of College Drinking

Alcohol use rapidly increases through the late teens, hits its apex in the early to mid-20s, and then declines into the 30s (Bachman et al. 2002; Carter, Brandon, and Goldman 2010; Jager et al. 2013; Johnston et al. 2011). This age-related trend appears to be driven by large numbers of young people going to college. In short, college students drink more often and in larger quantities relative to adults and other youth—moderately so among some students but significantly so among others. Because heavy drinking poses health risks in the short and long term, the heightened drinking of college students in the United States seems to contradict the robust association between educational attainment and health documented by medical sociologists (Carter et al. 2010; Jager et al. 2013; Schulenberg et al. 1994; Wechsler and Wuethrich 2002).

According to this literature, attaining more education facilitates the development of cognitive capacities (e.g., critical thinking skills) that enables one to efficaciously make more informed decisions about health. Education also enables the accumulation of social ties that positively influence healthy behavior and socially control unhealthy behavior (Mirowsky and Ross 2003). As a result, more educated Americans tend to have better health behavior, which promotes better health overall, above and beyond the economic benefits of education (Hout 2012; Ross and Wu 1995). The paradox of college-going and drinking within this connection between education and health likely reflects two phenomena. First, alcohol use is a social behavior, not just a health behavior, and it has great but variable symbolic value. As such, drinking provides opportunities to gain or lose status, and for social integration or marginalization, depending on how it is valued within a given context. Concerns about these social opportunities may trump health concerns (Abar and Maggs

2010; Dawson et al. 2004; Thombs, Olds, and Ray-Tomasek 2001). Second, the interplay of cognitive capacities and social resources in the link between education and health in adulthood may operate differently earlier in life for developmental reasons. Specifically, socioemotional areas of the brain controlling reward-seeking behavior develop faster than the cognitive areas controlling self-regulation. Consequently, youth in their late teens and early 20s tend to be highly oriented toward the approval of others without much cognitive control. This imbalance comes at a time when youth are emotionally individuating from parents and often physically distancing themselves as well. These interpersonal processes move peers to the center of social considerations and reduce perhaps the single most important social control that youth have experienced in their lives so far: parents (Schulenberg and Maggs 2002; Steinberg 2008).

Integrating these two phenomena, informed decision making about drinking may be more difficult in college because youth in a sensitive developmental period are entering a social context where drinking is more rewarded than in other social contexts across the life course. They are, therefore, more likely to increase their drinking as they move from high school into college and then decrease their drinking as they exit the drinking cultures of college campuses, continue maturing, and enter into new social contexts with more social constraints against drinking, such as work (Baer, Stacy, and Larimer 1991; Weitzman et al. 2003). For this reason, college students are targeted by a wide array of public health campaigns and intervention efforts related to drinking, and drinking is a major agenda item in higher education policy and administration. Reducing drinking and its many potential dangers can reduce injury, death, and other major threats to the well-being of youth in the short term and also reduce the potential for escalation or continuation of problematic drinking patterns in the long term (Schulenberg et al. 2001; Schulenberg and Maggs 2002). That reduction can be facilitated, we argue, by drawing on sociological theory to identify segments of the large and diverse college-going population most in need of attention.

Life course theory is especially relevant to unpacking the link between college-going and drinking. After all, entering college is a *transition*, a key life course element in which a person changes stage or setting. The theory suggests viewing transitions in terms of (1) *contextual processes*, in which a transition entails exposure to new sets of social norms and opportunities; (2) *timing*, with a transition's importance determined by when it occurs; and (3) *placement within a trajectory*, in which a transition unfolds and influences behavior according to the series of other experiences and contexts that preceded and follow it. Following these life course concepts, we take the following four steps to move past viewing college-going as a singular risk factor (Crosnoe and Johnson 2011; Patrick, Schulenberg, and O'Malley 2016).

Variation in College-going and Its Link to Drinking

First, considering contextual processes, different kinds of social contexts are organized by the various levels of higher education, particularly, two-year and four-year colleges (Deil-Amen and Turley 2007; Kalogrides and Grodsky 2011). Any transition into college likely entails some increase in a range of social factors that encourage drinking, and any transition out of college is likely to entail new constraints on drinking (e.g., the demands of work, the

social control aspects of family formation). Still, this contextual shift is likely to be more pronounced at four-year colleges, which are more often residential and distant from communities of origin, further weakening parental control and increasing immersion in peer environments (Lopez Turley 2009; Wechsler and Wuethrich 2002). Such colleges also host social activities and organizations that support party cultures. These students are less likely than their peers at two-year institutions to juggle studies with extensive work and family demands, so they have more leisure time and fewer deterrents against risky behavior (Abar and Maggs 2010; Larimer et al. 2004; Weitzman et al. 2003). Finally, graduates of four-year colleges tend to most delay family formation (meaning further avoidance of social control), have higher earning potential (which matters because substance use is price sensitive), and often enter careers that support social drinking (Cerdá, Johnson-Lawrence, and Galea 2011; Farrell, Manning, and Finch 2003; Humensky 2010; Michelmore and Musick 2014). Thus, relative to a two-year college or no college, transitioning into a four-year college is likely to involve a more pronounced uptick in drinking, while transitioning out involves a less pronounced downturn.

Second, considering timing, *when* young people start or leave college taps into the individual capacities and experiences that college-goers bring into their schools and what they get from being there. Many youths enroll in college immediately after high school, while some wait years, and others enter and exit over time. Thus, both starting (e.g., enrollment) and ending (e.g., dropout, graduation) points are distributed across an age span. Relative to population-level norms, therefore, college transitions can be off or on time (Goyette 2008; Pallas 2003). This diversity in the timing likely qualifies the link between college-going and drinking (Patrick et al. 2016). Students who enter and exit college at young ages should have the sharpest increases in drinking during college and the weakest drops after college, as they likely are less mature, have less developed self-regulation skills, and are more susceptible to peer influences than older students. They will also have fewer societal roles to juggle during college that could modulate risky behavior and a longer delay in taking on those roles after college (Bozick and DeLuca 2005; Goldstein and Kenney 2001; Michelson and Musick 2014).

Third, considering placement within a trajectory, college transitions are often linked in a series as young people move from one type of college to another or pursue multiple degrees (Pallas 2003). The number and combination of transitions could influence drinking by altering students' exposure to any one social context and by increasing stress. Many youth view two-year colleges as a stepping stone into four-year colleges and four-year colleges as a stepping stone into graduate education. In making these steps, some get off track—they complete one step but drop out before the next or churn between enrollments without progress (Goldrick-Rab 2006; Kalogrides and Grodsky 2011). Multiple transitions could indicate less duration and, therefore, less integration in a college setting, weakening push factors behind drinking. Consequently, students who transition from two-year to four-year colleges might drink less than students who are continuously enrolled in the latter. This protection against drinking, however, could be diluted when multiple transitions indicate instability. For example, moving in and out of colleges without forward progress could be stressful, triggering drinking as a coping mechanism (Deil-Amen and Turley 2007; Ham and Hope 2003; Tinto 1993). Thus, experiencing multiple college transitions could reduce the

spike in drinking during college (relative to not attending college) and in four-year colleges (relative to two-year ones), especially when they represent a step-by-step sequence of degree attainment rather than churning.

Fourth, as another dimension of the trajectory angle, consistency in social contexts before and after the college transition can qualify how it is experienced. We focus on students whose high school experiences mean that they are most likely to be socially integrated into the social contexts of the colleges in which they matriculate. By virtue of both the academic standards and costs of four-year colleges in the United States, young people who enter them after high school tend to be selective—relatively high-achieving, from more socioeconomically advantaged backgrounds, and graduates of “college-going” high schools. Consequently, a student with college-educated parents and a good high school grade point average (GPA) who makes such a transition will have much common ground with new college peers and some consistency in social contexts from high school into college. A student from more modest means with a lower academic profile would likely have less common ground with college peers and more inconsistency between high school and college (Morgan 2005; Rosenbaum 2001). Common ground and consistency facilitate integration into the social context of college, which facilitates exposure to and internalization of prevailing behavioral norms of that social context. To the extent that four-year colleges are social contexts with strong normative systems and opportunity structures for drinking, the students who transition into these colleges as part of a more seamless trajectory from high school will be most exposed to and influenced by these cultures. Conversely, the students for whom this transition is a distinct turning point on that trajectory of social contexts will be less exposed to and perhaps less influenced by such cultures (Bachman et al. 2002; Crosnoe and Riegle-Crumb 2007; Patrick et al. 2016; Schulenberg et al. 1994).

Integrating these four life course dimensions of college transitions to provide a more detailed picture of college-going leads to a general hypothesis. Due to a mixture of social and developmental processes, the tendency for the long-term link between education and health to have a short-term exception in the potentially problematic drinking trajectories of college-goers will be mostly limited to a particular segment of the college-going population. Specifically, the highest peaks in alcohol use in the early 20s and shallowest drops into the 30s will be found among youth who (1) matriculate at four-year colleges (contextual processes), (2) do so immediately after high school graduation and then complete higher education by the mid-20s (timing), (3) follow this pattern continuously and without reentering the system (series of transitions within a trajectory), and (4) have family backgrounds and high school academic and social histories most consistent with the four-year college social context (consistency in a trajectory). Such youth will have the most immediate health risk during college even if their higher-education experiences will eventually predict better lifelong health. We expect that deviations from this increasingly normative set of college transitions (e.g., going from high school into two-year colleges, entering any type of college in the late 20s, starting four-year colleges after two-year colleges) will chip away at these immediate drinking risks.

Data and Methods

Add Health is a nationally representative sample of 7th to 12th graders in the United States. Data collection began in 1994, when 90,118 students in 132 sampled high and middle schools completed the in-school survey. Of these students, 20,745 were sampled for the Wave I in-home interview in 1995. In 1996, 14,738 adolescents (excluding Wave I seniors) were followed up in the Wave II in-home interview. The Wave III sample consisted of Wave I respondents who were 18 years of age or older, resulting in 15,197 young adults ages 18 to 26 interviewed between 2001 and 2002. Wave IV interviewed 15,701 respondents, ages 24 to 32, in 2007 and 2008.

Our analytical sample included 6,315 Wave I high schoolers who participated in all four waves. This sample represented a sizeable decrease from the full Wave I sample, introducing concerns about sampling bias. The biggest drop in sample size (to 9,421) occurred because of the need to include youth who had data at all four waves. Doing so excluded all Wave I seniors, who were not retained in Wave II by design. It also dropped youth who left the sample across waves. Notably, the longitudinal sampling weights in Add Health data were created to address differential attrition (along with other deviations from representativeness in the original sampling frame). The other major loss occurred because of our need to focus only on students who were already in high school by Wave I, given that high school is when the uptick in drinking usually begins and social drinking becomes more common (Patrick and Schulenberg 2010). Doing so did not introduce bias beyond narrowing the age range. Table 1 provides descriptive statistics for all variables in this analytical sample.

Measurement

Alcohol use—In all waves, respondents reported how many days they drank alcohol during the past 12 months. Following Add Health conventions (Crosnoe 2006; Resnick et al. 1997), responses were coded into a scale from 0 (never) to 6 (every day). An alternate to this ordinal scale capturing days of drinking in the last month yielded similar results. A measure of binge drinking (defined as five or more drinks per sitting) was available, but its high rate of 0 values led to frequent nonconvergence of models. Comparing results in the subsample of drinkers (thereby reducing the number of 0 values) revealed more similarity than difference between binge drinking and any drinking.

College transition experiences—Waves III and IV educational histories classified youth by combinations of educational attainment (no high school degree, high school degree, two-year degree, four-year degree or higher), timing of degree (early/on time, defined as age 25 or under, vs. late, defined as over age 25, based on population patterns of age at graduation and years of enrollment), and enrollment (current student or additional schooling vs. no attendance since degree). This classification resulted in 40 groups, reduced to 8 after assessing cell coverage and conceptual overlap, including high school graduates who (1) transitioned into postsecondary education and then transitioned out of it without a degree (high school only), (2) transitioned into and completed a two-year degree early (two-year early), (3) transitioned into and completed a two-year degree late (two-year late), (4) transitioned into and out of a two-year college with a degree and then transitioned into and

out of a four-year college without a degree (two-year plus), (5) transitioned into and completed a four-year degree early (four-year early), (6) transitioned into and completed a four-year degree in another way (e.g., late, after exiting a two-year college; four-year other), (7) transitioned into and out of a four-year college with a degree and then transitioned into and out of graduate school without a degree (four-year plus), and (8) transitioned into and out of graduate school with a degree (four-year post). For comparison, we included two categories of youth who did not attend college: those who transitioned out of high school with and without a degree (see Table 1).

Precollege social contexts—To gauge family background, parent education was based on students' Wave I reports of the highest educational attainment of parents, ranging from 1 (less than high school graduation) to 5 (postbachelor education). To gauge academic aspects with known relations with college-going and drinking, we measured GPA and math course-taking level with high school transcripts (Crosnoe and Riegle-Crumb 2007). The first averaged grades across courses (0 to 4). The second measured math enrollment (no math = 4, Remedial Math = 1, General Math = 2, Prealgebra = 3, Algebra I = 4, Geometry = 5, Algebra II = 6, Advanced Math = 7, Precalculus = 8, and Calculus = 9). Both measures were taken from the ninth-grade transcript year to capture early history prior to the first alcohol-use measurement.

To gauge high school peer norms, we measured academic press as the mean of four z-scores: mean academic achievement (self-reported GPA in the in-school survey aggregated to school level), mean educational aspirations (aggregated reports of expectations of graduating from college), percentage of student body taking math and science (also aggregated based on in-school survey reports), and percentage of seniors going on to four-year colleges (based on school administrator estimates). For school drinking norms, a school-level measure of alcohol use was created through aggregation of in-school survey data. Although peer network data were available during the high school waves, we chose to measure peer norms on the school level to capture the broader social climates of schools and because the peer network data had some limitations (e.g., more missing data, inconsistencies in data collection across schools). Importantly, robustness checks with peer network measures did not offer any new insights relative to the school-level approach reported here.

Covariates—To account for demographics, control variables measured age, gender (male = 1, female = 0), family structure (two-parent family at Wave I = 1, other family types = 0), and race-ethnicity (dummy variables for non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic Asian, and other/multiple races). Other covariates linked to youths' educational pathways and/or alcohol use were measured as potential spurious factors: depression (measure ranging from 0 to 27 based on the sum of nine items from the Center for Epidemiologic Scale–Depression), percentile score on the Picture Vocabulary Test (a proxy for general cognitive skills), and delinquency, which summed reports (ranging from never = 0 to 5 or more times = 3) of nine activities (e.g., selling marijuana, getting in a serious fight).

Analytical Strategy

A latent growth curve was estimated from measures of alcohol use at four time points from Wave I (when respondents were in high school) through IV (when they were in their late 20s to early 30s). The first latent factor, the intercept, was set at Wave IV to indicate the end point of the trajectory. The second, the slope, measured the rate of change in the trajectory across waves. Given the uneven spacing of waves, factor loadings indicated the years between assessments (i.e., -11, -10, -5, 0; the negative signs indicate spacing prior to the intercept, modeled as the growth curve end point). A quadratic (and for some models, a cubic) latent factor captured the “correction” in the slope, or wave-to-wave fluctuations in the rate of change.

One feature of this analysis is that interview year, rather than age or grade level, served as the time variable. We structured the models this way because of the complexities of the multicohort sample. Using age would have resulted in varying levels of cell coverage at different points of the growth curve across cohorts. For example, if the growth curve was estimated for ages 15 to 30, some youth would have been missing data in the early part of the curve (their Wave I data occurred before they were 15), while others would have been missing data in the later part (their Wave IV data occurred after they were 30). The same would have been true with grade. Using interview year to create the growth curves was not ideal, but it was statistically straightforward. Moreover, our decision to focus on high school students who participated in all four waves (effectively leaving only Wave I 9th to 11th graders) meant that the age range within any given interview year was narrow. About 85% of the sample were ages 15 to 17 at Wave I, with the vast majority of the remaining 15% being age 14 or 18. Thus, we cannot talk about aspects of growth curves at specific ages, but we can do so in terms of narrow age bands.

All analyses were estimated in Mplus using full-information maximum likelihood to address missing data. They incorporated weights to deal with oversampling and differential attrition. Modeling also corrected Add Health design effects (e.g., clustering of data within schools) with a robust standard error estimator.

Because simultaneously estimating growth curves for each college transition group proved unwieldy, we adopted an alternate two-step approach. In the first step, growth curves were estimated for three major *categories* of college transition experiences, regressing the alcohol-use latent factors on dummy variables designating each of the specific *groups* within each category. In the second step, specific groups were selected for cross-category comparisons. A single model focused on youth in the selected groups, with the dummy variables designating group membership predicting the latent factors. These steps allowed us to draw conclusions for our general hypothesis about contextual process (e.g., level of college), timing (e.g., age during college career), and placement within a sequence (e.g., number and combination of college transitions) that highlighted the possibility of the four-year early group as the college transition experience with the most problematic drinking trajectories.

The final component of the hypothesis concerned another dimension of placement within a sequence—alignment between precollege and college social contexts moderating the association between college transitions and drinking. To avoid three-way interactions, we

performed multigroup modeling on focal groups selected to capture important contrasts. In each group, we compared how much family background, high school achievement, and high school peer norms predicted the latent factors across groups. Significant differences were indicated when constraining the focal parameters (e.g., high school GPA predicting the slope of drinking) to be equal across groups significantly reduced model fit, as determined by chi-square tests.

Ancillary modeling gauged the sensitivity of results to various changes: (1) prior alcohol use did not predict college transitions until the very end of the time frame, discounting concerns about bidirectionality; (2) gender did not consistently moderate the focal associations; and (3) controlling for self-reported measures of college peers' drinking did not attenuate the college transition variables (results available upon request).

Results

Figure 1A depicts the growth curve for alcohol use, controlling for family background, academic history, high school context, and all covariates ($\chi^2 = 19.31$; comparative fit index [CFI] = .991; root mean square error of approximation [RMSEA] = .037). Its basic shape reflected the mean values of the latent variables (intercept = 2.30, $p < .001$; slope = $-.32$, $p < .001$; quadratic = $-.08$, $p < .001$; cubic = $-.004$, $p < .001$). Alcohol use was initially low (the average adolescent drank once or twice in the past year), increased across adolescence, peaked in the early 20s, and tapered off slightly into adulthood.

Alcohol Trajectories Associated with Major College Transitions

To test the hypothesis about how different configurations of college transition experiences (and non-college-going) predicted drinking trajectories, we first disaggregated the sample into major categories and then estimated a growth curve within each category. Model 1 in Table 2 had no predictors besides the dummy variables for the various college transition groups in that category, and Model 2 added family background, high school achievement, high school peer variables, and the covariates. In both models, the reference for the dummy variables was rotated to capture all pairwise comparisons among the various groups within the major category. The Model 2 coefficients were then used to graph drinking trajectories for each group subsumed within each major category (Figures 1B to 1D).

The first major category included *youth who transitioned out of the educational system with a high school diploma as the terminal degree*, which subsumed two separate groups (high school only, high school plus; left portion of Table 2 and Figure 1B). The general trend was for youth in this category to start out drinking once or twice in the past year but increase their drinking over time, peaking in young adulthood and leveling out or slightly declining into their late 20s to early 30s. The two groups within this category significantly differed on the intercept, which represented the end point of the trajectory. High school graduates who did not transition into college ended up drinking slightly less than high school graduates who transitioned into college without ultimately earning a degree ($b = -.31$, $p < .01$, in Model 1). The addition of the precollege history variables and the controls reduced the magnitude and significance level of this coefficient ($b = -.13$, not significant, in Model 2). No differences between these two groups were detected in the general pattern of change in

alcohol use over time (i.e., the coefficients for group membership predicting the slope were nonsignificant).

The second major category included *youth who transitioned out of the system with a two-year degree as the terminal degree*, which subsumed three separate groups (two-year early, two-year late, and two-year plus; middle of Table 2 and Figure 1C). Overall, two-year degree earners began drinking once or twice a year and increased their drinking into young adulthood, to about once a month or less, before leveling out or slightly decreasing into their late 20s to early 30s. The two-year early group had a steeper increase from adolescence into young adulthood ($b = .04, p < .01$) than the two-year plus group, a difference that was marginally significant after all covariates were added ($b = .03, p < .10$). The level of alcohol use in young adulthood (i.e., the intercept) differed across these three two-year groups. The two-year early and late groups showed more drinking than the two-year plus, although these differences no longer reached conventional levels of significance once other factors were controlled.

The third major category included *youth who transitioned out of the educational system with a four-year degree or higher as the terminal degree*, which subsumed four groups (four-year early, four-year other, four-year plus, four-year post; right side of Table 2 and Figure 1D). Overall, youth in this category started with low levels of drinking (once or twice in the past year), steeply increased with a peak in young adulthood (once a month to two or three days a month), and declined slightly over time while maintaining a relatively high level of drinking into their late 20s and early 30s. The four groups only significantly differed on the intercept. A higher level of drinking in the late 20s and early 30s was observed in the four-year-early group compared to the other groups. These differences are indicated by the significant or marginal early four-year-degree coefficients in Models 1 and 2, which persisted no matter the reference.

The next step in testing the hypothesis about how college transition experiences predicted drinking trajectories was to select groups for cross-category comparisons. We began with two groups of youth who actually attended the major levels of higher education: (1) two-year early, chosen to represent youth who transitioned out of the educational system with a terminal two-year degree because it is a popular but understudied “middle ground” in educational attainment, and (2) four-year early, as it represents what is increasingly viewed as the normative pathway of college-going that was the focus of our hypothesis. For contrast with these two college-going groups, we chose two groups of youth who did not attend college. The first was the high school only group, who had at least some formal education credential. The second was a heretofore unstudied group (high school dropout) because it is a source of public concern and target of intervention. Table 3 provides the results of the growth curve models of alcohol use in these four groups before and after adding covariates, and Figure 1E illustrates the fully controlled results.

In Table 3, significant group differences in alcohol use were clearest when the four-year early group was compared to the other three groups. Specifically, they had steeper increases in alcohol use and higher levels overall than youth in the other groups (Model 1). This pattern persisted when family background, high school variables, and controls were included

in Model 2. The high school dropouts also stood out. Compared to the two-year early and high school only groups, dropouts had a less steep increase in drinking over time and lower levels of drinking by the end of the time frame, but these differences were mostly washed out by the covariates. Thus, the part of the hypothesis about unhealthy drinking trajectories being more common among youth who transitioned into and completed four-year colleges in their early 20s was generally supported (Figure 1E). Young adults in the four-year-early group exhibited more drinking during this period than other groups, including youth who attended other colleges or did not attend at all and especially youth who did not complete the basic requirement for any level of college-going (i.e., graduating high school).

Considering Alignment across the College Transition

The remaining part of the hypothesis concerned the possibility that links between the focal four-year college transition and drinking would be more pronounced among students with characteristics (parent education, high school achievement, high school peer norms) suggesting more potential alignment between their precollege and college social contexts. As seen in Tables 2 and 3, school-level academic press and peer drinking consistently predicted higher alcohol use in young adulthood and inconsistently predicted greater increases across groups and categories. To test the hypothesis, we examined the degree to which the precollege social contexts variables differentially predicted the latent factors of drinking across college transition groups (i.e., effectively estimating Precollege History \times College Transition interactions). Table 4 presents coefficients from multigroup modeling that significantly differed across groups.

Beginning with family background, parent education was a stronger predictor of the intercept in groups representing lower educational attainment than in groups representing higher educational attainment. The coefficient was significant for high school graduates but missed significance for high school dropouts, possibly due to small cell size. Constraining the coefficients to be equal across groups reduced model fit, suggesting that observable differences among the four groups were meaningful. The within-category analyses (not shown) echoed this pattern, as parent education was a stronger predictor of drinking among high school graduates who did not pursue any more education than among those who did. Marginally significant cross-group differences were also detected in the link between parent education and the slope of the growth curve, with parental education being a stronger predictor of the slope of the high school graduates compared to others. Thus, contrary to expectations, parent education was more strongly related to greater drinking among youth who did not attend college than among those who did, including those in the focal four-year-early college group.

Turning to early academic history, school-level academic press was the only factor that played a different role in alcohol-use trajectories across the selected groups (school-level drinking was similarly associated with the intercept in all four groups). Its positive association with the intercept was significantly stronger among two-year-degree holders (and, according to within-category analyses not shown, among two-year-degree holders who did not pursue more education) than among others. The link between high school academic press and the slope did not differ across the educational attainment groups. Again, contrary

to expectations, high school academic press was more strongly related to greater drinking among youth who did not attend four-year colleges than among those who did, including those in the focal four-year-early college group.

Our hypothesis was that young four-year college students with college-educated parents, good high school academic performance, and high school peer norms emphasizing both social and academic achievement would experience more alignment between precollege and college social contexts, magnifying their social integration in college so that they drank more. This kind of alignment did not matter. Instead, students with these backgrounds who attended no college or two-year colleges—a form of misalignment—had drinking trajectories similar to young four-year college students.

Discussion

College-going is a key factor differentiating Americans with high and low educational attainment. Sociologists have shown that higher educational attainment is related to better health in the long term (Mirowsky and Ross 2003), so why does the same not hold in the short term when it comes to drinking? The answer is likely that various stages of the life course represent different developmental periods with new social norms, opportunities, and constraints. Adolescence and young adulthood are periods of greater risk taking, and colleges magnify this developmental trend by exposing young people to party cultures with insufficient adult oversight. As a result, college students drink, sometimes within the realm of social drinking that is not a clear health risk but can still put them in harm's way, sometimes at levels that are clearly not conducive to health in the short or long term (Jager et al. 2013; Wechsler and Wuethrich 2002). This study explored this link between developmental and social forces on college campuses with a focus on breaking down what is often treated as a monolithic risk category into specific subgroups with varying levels of risk.

As a reminder, we investigated college-going in four ways based on three life course concepts: (1) contextual processes (more problematic drinking at four-year colleges), (2) timing (more problematic drinking among young students), and (3) placement within a trajectory (more problematic for youth who enter and exit college without other transitions *and* for youth whose precollege social contexts are most aligned with four-year colleges). Our results suggested some, but not complete, support for these hypotheses. In short, one group of youth likely to enjoy the benefits of the adult link between educational attainment and health was most likely to have a problematic health trajectory during young adulthood, and a group of youth least likely to enjoy these benefits appeared to be healthiest according to this one health behavior.

The popular conception of a college student in the United States is a young person transitioning from high school who finishes his or her studies and exits college while still in the early 20s. Our results show that this college transition experience is most closely associated with the sharp-increase/shallow-decline trajectory of drinking in the early decades of the life course that has generated so much attention. These youth represent the “perfect” match between developmental immaturity and risk-inducing social environments. After

relatively low drinking levels in high school, they increased their drinking steeply upon entering college. We should point out that these changes occurred within a bandwidth of social drinking that may not itself be a concern. Still, within this population trend is an increase in youth who are a concern. For example, although the average student who transitioned from high school into four-year college and ultimately graduated early had a level of drinking during the college years of 2.94 (standard deviation = .11) that represented drinking about one to three days a month, 29% of such students had a more problematic drinking profile (i.e., binge drinking several times a month or more). Regardless of level, drinking among college students has been studied often. What is interesting here is that even once these young adults transitioned out of college, their drinking remained stably higher than those who did not attend college or who attended college in different ways. They may have entered employment settings with comparable peers in which drinking was typical in work- or non-work-related social situations, and they may have remained immersed in a pre-marriage/pre-partnership milieu that fostered social drinking.

This pattern contrasts the drinking of a particular group of non-college-goers, high school dropouts, who had relatively low levels of alcohol use that fluctuated within a narrow bandwidth. This trajectory might be surprising to the extent that dropout is reciprocally linked to risky behavior. In other words, given the adjustment problems of many dropouts, the lower future socioeconomic prospects dropouts have, and the potential for drinking to disrupt high school academic progress (Crosnoe, Benner, and Schneider 2012; Rumberger 1987), high school dropouts might be assumed to follow more problematic drinking trajectories. Our results suggest that they do not, perhaps tapping into qualitative differences between drinking and other forms of problem behavior in adolescence. In many contexts, drinking facilitates social integration and activities. Thus, the lower-than-expected drinking of high school dropouts might be part of a larger experience of social disengagement. Those who have dropped out or are on the path to doing so may be removed from social settings that involve drinking, such as parties and outside networks that foster drinking (Crosnoe et al. 2012; Staff and Kreager 2008).

Students on the early four-year college transition pathway also differed significantly in many ways from their fellow four-year college-goers who entered early or later, came from two-year colleges, did not finish, or continued afterward. These deviations tended to chip away at the rate of increase in drinking into young adulthood and magnify its eventual decline, likely because the reduced social integration or increased social constraints relative to others in four-year colleges. A similar but weaker pattern emerged among youth whose terminal degree was from a two-year college. Late entries, lack of completion, or pursuit of additional education reduced drinking among those college-goers, again likely by disrupting social influences. Notably, the overall level of drinking in the two-year transition category suggests that these transition experiences were yet another deviation from the early four-year college experience chipping away at changes in drinking over time.

In many ways, four-year college-goers (those transitioning into and graduating early in their 20s) are advantaged in the long term. They are well positioned to accrue more socioeconomic resources than youth who follow other transition patterns, and as research suggests, they are likely to enjoy better lifelong health (Hout 2012; Mirowsky and Ross

2003). Yet, the spike in drinking that accompanies their college transition experiences also puts some of them at risk. At the same time, college drinking can be conceptualized as a means of socializing college students into a future adult life in which drinking is a lubricant in social activities associated with higher-socioeconomic-status lifestyles (Cerdá et al. 2011; Huckle, You, and Casswell 2010; Wechsler and Wuethrich 2002). By drinking less, they may accrue benefits in basic functioning, health, and even mortality, and their less frequent alcohol use may keep them on task in school. These benefits, however, may come at the expense of the accumulation of social capital that is important to future success. Thus, the repercussions of college drinking are mixed, contributing to poorer well-being but also possibly, for some, signifying social integration and preparation for future success across the life course that eventually promotes health.

To add another layer of complexity, we also explored whether the link between the early four-year college transition and drinking might be magnified when students came from family and high school social contexts associated with that pathway. We did not find evidence to support this expectation. Instead, such family and high school backgrounds moderated the association between *not* following this pathway and drinking. Youth who appeared on track for the early four-year transition experience (in terms of family background or early schooling) but did not actually follow it had longitudinal drinking profiles that looked more like the early four-year college graduates than their peers with more similar transition experience. These findings suggest that selection arguments that focus solely on whether the link between education and drinking is confounded by background factors are too simplistic. Selection works in a more interactive way. This link may be partly spurious because of selection factors, but any observed effects of educational attainment on drinking that are not spurious may be conditioned by whether someone in that transition experiences alignment or misalignment in their social contexts before and after it. The mechanisms for the misalignment we found might be self-medication of disappointments related to not achieving what was expected or maintaining the same peers from high school after they have attended college—where what seems to be misalignment in social contexts masks continuity (Crosnoe and Riegle-Crumb 2007).

Of course, more can be done to strengthen these conclusions in addition to correcting some of the limitations of Add Health's measurement of alcohol use. Certainly, the link between drinking and college transition experiences is bidirectional. Additionally, other dimensions of college life, such as college selectivity, campus climate, and college student achievement, could also moderate the link between college transitions and drinking. Finally, college-going is tied up with other social pathways (e.g., union formation, labor force participation) that could influence drinking. Like educational attainment, many such pathways are thought to affect motivations and opportunities for drinking by organizing social relations and acting as social controls. Their apparent links to drinking may also be rooted in selection (Bachman et al. 2002; Gotham, Sher, and Wood 1997; Staff et al. 2010). Until the overlap among these social pathways is studied dynamically in greater depth, the role of educational attainment in drinking may be obscured.

Addressing these limitations and following up on these conclusions is important given the great concern, debate, and action centering on the issue of drinking among college students.

Digging into the variability is a way to better tailor prevention/intervention efforts. It also sheds light on stage-specific exceptions to general life course trends.

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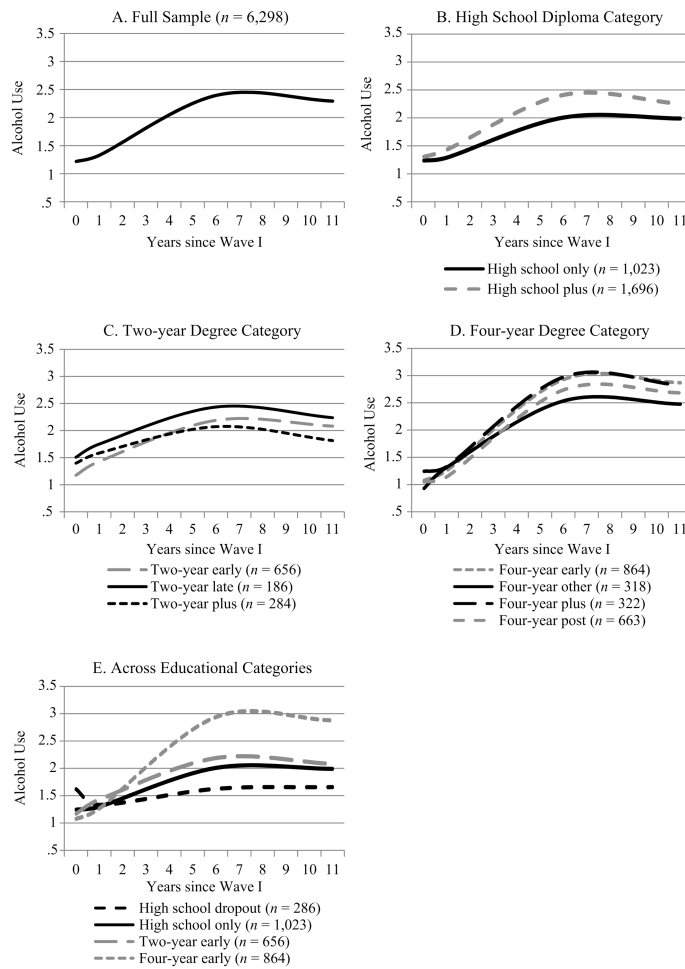


Figure 1. Adjusted Alcohol Trajectories of Alcohol Use by College Transition Groups, National Longitudinal Study of Adolescent Health, Waves I–IV.

Table 1
 Descriptive Statistics for Variables by Educational Attainment, National Longitudinal Study of Adolescent Health, Waves I—IV.

Variable	High School Category				Two-year Category				Four-year or Higher Category			
	All Groups	High School Dropout	High School Only	High School Plus	Two-year Early	Two-year Late	Two-year Plus	Four-year Early	Four-year Other	Four-year Plus	Four-year Post	
Sample size	6,298	286	1,023	1,696	656	186	284	864	318	322	663	
Weighted percentage	5.04%	18.46%	27.10%	9.76%	2.78%	3.91%	14.06%	4.65%	5.09%	9.02%		
Alcohol use (mean)												
Wave I	1.24	1.59	1.25	1.31	1.18	1.51	1.42	1.08	.97	1.24	1.04	
Wave II	1.35	1.33	1.30	1.44	1.38	1.72	1.51	1.27	1.25	1.34	1.15	
Wave III	2.40	1.62	2.00	2.41	2.20	2.43	2.08	2.94	2.57	2.98	2.74	
Wave IV	2.30	1.65	2.00	2.25	2.07	2.23	1.81	2.87	2.47	2.83	2.68	
Focal covariates (mean)												
Parent education	2.94	1.91	2.39	2.77	2.76	2.78	2.82	3.54	3.23	3.62	3.87	
Math sequence ninth grade	3.67	2.55	3.00	3.52	3.48	3.57	3.53	4.28	3.93	4.35	4.43	
GPA ninth grade	2.60	1.43	2.03	2.38	2.56	2.38	2.56	3.23	2.85	3.16	3.35	
High school academic press	-.06	-.39	-.30	-.10	-.08	-.13	-.04	.18	.05	.13	.24	
High school peer drinking	1.44	1.46	1.41	1.43	1.45	1.48	1.45	1.45	1.45	1.52	1.44	
Control variables (mean or percent)												
Age	16.02	16.39	16.22	15.98	16.01	16.20	15.88	15.82	15.99	15.83	15.94	
Gender (male)	49.97%	59.82%	58.79%	53.11%	42.97%	45.52%	26.67%	49.76%	48.09%	49.94%	37.31%	
Family structure (two-parent)	56.52%	41.91%	48.11%	47.89%	59.19%	51.52%	52.22%	73.68%	60.75%	71.58%	70.91%	
White	64.87%	48.67%	60.95%	61.76%	70.37%	59.95%	62.03%	70.23%	71.76%	72.29%	72.18%	
Black	14.58%	22.59%	16.29%	17.84%	8.57%	21.56%	14.51%	10.58%	8.73%	11.02%	12.44%	
Hispanic	12.23%	18.29%	15.84%	13.19%	10.42%	15.05%	15.16%	8.35%	11.80%	8.14%	6.95%	
Asian	3.77%	2.45%	2.70%	2.72%	4.17%	1.00%	3.56%	7.01%	3.57%	2.92%	5.63%	
Other/multiple races	4.55%	8.00%	4.21%	4.48%	6.48%	2.45%	4.74%	3.83%	4.14%	5.64%	2.78%	
Picture Vocabulary Test score	54.12	28.58	41.64	52.96	52.65	48.18	51.98	66.88	60.08	67.12	72.17	
Depressive symptoms	7.60	9.66	8.42	7.78	7.38	8.22	8.96	6.26	6.94	7.02	6.37	
Delinquency	1.63	1.80	1.72	1.72	1.45	2.21	1.82	1.51	1.63	1.58	1.27	
Binge-drink friends Wave III	1.11	1.16	1.17	1.02	1.03	1.11	.84	1.24	1.30	1.02	1.09	

Note: GPA = grade point average.

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Table 2
 Results from Growth Curve Models of Alcohol Use by Educational Attainment within Major Educational Categories, National Longitudinal Study of Adolescent Health, Waves I–IV.

Reference Group	High School Category ^b (n = 2,719)		Two-year Category ^{a,c} (n = 1,126)		Four-year Category ^{a,d} (n = 2,167)	
	(1)	(2)	(1)	(2)	(1)	(2)
Educational groups						
<i>Intercept</i>						
High school only	-.31**	-.13				
Two-year early			.29 [†]	.16		
Two-year late			.44*	.29		
Four-year early					.20*	.18*
Four-year other					-.21	-.04
Four-year plus					.16	.09
<i>Slope</i>						
High school only	-.02	.00				
Two-year early			.04**	.03 [†]		
Two-year late			.03	.03 [†]		
Four-year early					.01	.02
Four-year other					-.02	.01
Four-year plus					-.01	.00
Focal covariates						
<i>Intercept</i>						
Parent education		.10 [†]		-.04		.14**
Math sequence ninth grade		.07		-.07		.06
GPA ninth grade		.08		-.03		.14
High school academic press		.12		.47***		.15 [†]
High school peer drinking		.03		.43*		.39 [†]
<i>Slope</i>						

Reference Group	High School Category ^b (n = 2,719)		Two-year Category ^{a,c} (n = 1,126)		Four-year Category ^{a,d} (n = 2,167)	
	High School Plus		Two-year Plus		Four-year Post	
	(1)	(2)	(1)	(2)	(1)	(2)
Parent education		.01		-.01		.02 ^{**}
Math sequence ninth grade		.00		-.01		.00
GPA ninth grade		.01		.01		.03 [*]
High school academic press		.00		.02		.00
High school peer drinking		-.04 [*]		-.01		-.03
Control variables						
<i>Intercept</i>						
Age		-.06 [†]		-.09		-.11 [*]
Gender (male)		.70 ^{***}		.84 ^{***}		.28 ^{**}
Family structure (two-parent)		-.04		-.18		-.33 ^{**}
Black		-.27 [†]		-.31		-.60 ^{***}
Hispanic		-.17		-.02		.08
Asian		-.05		-.29		-.33 [†]
Other/multiple races		.01		-.49 [†]		-.36
Picture Vocabulary Test score		.01 ^{***}		.01 ^{***}		.01 [*]
Depressive symptoms		.00		-.02 [†]		-.02 [*]
Delinquency		.06 [*]		.11 [*]		.15 ^{***}
<i>Slope</i>						
Age		-.03 ^{***}		-.03 ^{***}		-.03 ^{***}
Gender (male)		.06 ^{***}		.06 ^{***}		.05 ^{***}
Family structure (two-parent)		.01		.00		-.02
Black		.01		.04 [†]		-.02
Hispanic		-.01		.00		.01
Asian		.07 [†]		.05 [†]		.01
Other/multiple races		.02		.00		-.02

Reference Group	High School Category ^b (n = 2,719)		Two-year Category ^{a,c} (n = 1,126)		Four-year Category ^{a,d} (n = 2,167)	
	High School Plus		Two-year Plus		Four-year Post	
	(1)	(2)	(1)	(2)	(1)	(2)
Picture Vocabulary Test score		.00**		.00***		.00 [†]
Depressive symptoms		.00		-.01***		-.003**
Delinquency		-.01***		-.01*		-.01*

Note: GPA = grade point average.

^aOther rotations tested, but no education coefficients were significant ($p < .05$).

^bUnadjusted model fit: comparative fit index (CFI) = .990, root mean square error of approximation (RMSEA) = .027. Adjusted model fit: CFI = .938, RMSEA = .033.

^cUnadjusted model fit: CFI = .965, RMSEA = .041. Adjusted model fit: CFI = .963, RMSEA = .025.

^dUnadjusted model fit: CFI = .996, RMSEA = .018. Adjusted model fit: CFI = .962, RMSEA = .031.

[†] $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 3
 Results from Growth Curve Models of Alcohol Use by Educational Attainment across Major Educational Categories, National Longitudinal Study of Adolescent Health, Waves I–IV.

Reference Group	Across Education Categories ^a (n = 2,829)					
	Four-year Early		Two-year Early		High School Only	
	(1)	(2)	(1)	(2)	(1)	(2)
Educational groups						
<i>Intercept</i>						
High school dropout	-1.40***	-.76***	-.53***	-.23	-.41*	-.18
High school only	-.99***	-.58***	-.12	-.05		
Two-year early	-.87***	-.53***				
Four-year early						
<i>Slope</i>						
High school dropout	-.15***	-.08***	-.07***	-.02	-.06**	-.03 [†]
High school only	-.10***	-.05***	-.01	.007		
Two-year early	-.09***	-.06***				
Four-year early						
Focal covariates						
<i>Intercept</i>						
Parent education		.08 [†]		.08 [†]		.08 [†]
Math sequence ninth grade		.02		.02		.02
GPA ninth grade		.05		.05		.05
High school academic press		.17*		.17*		.17*
High school peer drinking		.34*		.34*		.34*
<i>Slope</i>						
Parent education		.00		.00		.00
Math sequence ninth grade		.00		.00		.00
GPA ninth grade		.02 [†]		.02 [†]		.02 [†]
High school academic press		.00		.00		.00

Reference Group	Across Education Categories ^a (n = 2,829)					
	Four-year Early		Two-year Early		High School Only	
	(1)	(2)	(1)	(2)	(1)	(2)
High school peer drinking		-.01		-.01		-.01
Control variables						
<i>Intercept</i>						
Age		-.06 [†]		-.06 [†]		-.06 [†]
Gender (male)		.70 ^{***}		.70 ^{***}		.70 ^{***}
Family structure (two-parent)		-.11		-.11		-.11
Black		-.57 ^{***}		-.57 ^{***}		-.57 ^{***}
Hispanic		-.35 [*]		-.35 [*]		-.35 [*]
Asian		-.59 ^{***}		-.59 ^{***}		-.59 ^{***}
Other/multiple races		-.35		-.35		-.35
Picture Vocabulary Test score		.01 ^{**}		.01 ^{**}		.01 ^{**}
Depressive symptoms		-.02 ^{***}		-.02 ^{***}		-.02 ^{***}
Delinquency		.07 ^{**}		.07 ^{**}		.07 ^{**}
<i>Slope</i>						
Age		-.02 ^{***}		-.02 ^{***}		-.02 ^{***}
Gender (male)		.07 ^{***}		.07 ^{***}		.07 ^{***}
Family structure (two-parent)		.00		.00		.00
Black		-.02		-.02		-.02
Hispanic		-.03 [†]		-.03 [†]		-.03 [†]
Asian		.01		.01		.01
Other/multiple races		-.02		-.02		-.02
Picture Vocabulary Test score		.001 ^{**}		.001 ^{**}		.001 ^{**}
Depressive symptoms		-.003 ^{***}		-.003 ^{***}		-.003 ^{***}
Delinquency		-.02 ^{***}		-.02 ^{***}		-.02 ^{***}

Note: GPA = grade point average.

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^aUnadjusted model fit: comparative fit index (CFI) = .949, root mean square error of approximation (RMSEA) = .050. Adjusted model fit: CFI = .937, RMSEA = .033. Coefficients for controls are identical.

[†] $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 4

Family Background and High School Coefficients That Significantly Differed across Education Categories in Multigroup Growth Curve Models of Alcohol Use, National Longitudinal Study of Adolescent Health, Waves I–IV.

Variable	Across Education Categories ($n = 2,829$)			
	High School Dropout	High School Only	Two-year Early	Four-year Early
<i>Intercept</i>				
Male				
Parent education	.19	.21*	-.10	.03
Math sequence ninth grade				
GPA ninth grade				
High school academic press	-.37	.17	.45***	.19
High school peer drinking				
<i>Slope</i>				
Male				
Parent education	.00	.02 [†]	-.01	.00
Math sequence ninth grade				
GPA ninth grade				
High school academic press				
High school peer drinking				

Note: All models included controls. Significant differences in coefficients measured by changes in chi-square relative to degrees of freedom. GPA = grade point average.

[†] $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.