A Life Course Model of Education and Alcohol Use*

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Abstract

Working from a life course perspective, this study examined the paradoxical association between academic status and drinking across the transition to young adulthood with multilevel modeling and a nationally representative sample of young people from the Add Health data project (*n* = 6,308). Taking academically advanced courses in high school was associated with lower rates of current drinking and binge drinking during high school (grades 9–12) but higher rates of both after high school (age range: 20–26). This positive longitudinal association between academic status and drinking was explained partly, but not completely, by educational, family, and work circumstances in young adulthood. The association was less likely to occur among students who attended high schools in which high achievement was the norm. Thus, the association between academic status and drinking behavior reverses across the transition to young adulthood, especially in certain types of peer environments within the educational system.

Alcohol use has a dualistic nature in American society. Ingrained in everyday social life, it also carries a certain social stigma. Depending on the circumstances, it can be either healthy or unhealthy, appropriate or risky. These complexities spark many questions: Who drinks? Why do people drink? Is drinking good, bad, or neutral? Not surprisingly, the quest to answer these questions has translated into multiple theories, both popular and scientific. The life course perspective, in particular, is a useful theoretical framework for better understanding alcohol use because it encourages further investigation into the very age-graded and context-specific aspects of drinking that make alcohol use such an intriguing area of study (Bachman et al. 2002).

Specifically, the life course perspective considers how drinking is structured by transitions and trajectories within social contexts—how and why the reasons for and implications of drinking vary by time and place (Elder, Johnson, and Crosnoe 2003; Schulenberg, Maggs, and O'Malley 2003). The transition to young adulthood is a valuable crucible in which to observe this phenomenon. This transition represents a tidal change in responsibilities, norms, and opportunities that sends young people onto different pathways into adulthood (Shanahan 2000). The diversity in these pathways likely has different implications for alcohol use—

increases in alcohol use for some, decreases for others—with some variation due to the general norms of the social context in which the transition occurs (Bachman et al. 1997).

Guided by such a life course perspective as well as past research on alcohol use, this study considers continuity and change in drinking across the transition to young adulthood in an educational context. The general premise is that, during this transition, high school students with two different kinds of elite academic credentials—high-level course work and good grades —will experience a gradual lifting of previously strong constraints on drinking, while students at the other end of the academic hierarchy will experience a gradual dampening of previously strong encouragements to drink. These dual changes in the incentives for and against drinking will manifest themselves in a *reversal* in the direction of the association between academic status and drinking behavior across the transition to young adulthood. Moreover, because of the context-specific nature of socializing messages, this reversal probably varies in magnitude across high schools differing in academic and social norms.

Our investigation of this life course phenomenon draws on the National Longitudinal Study of Adolescent Health (Add Health). These data provide a particularly strong match between theory and methods because they cover the transition to young adulthood; they contain extensive information on health behavior; and, with the completion of the Adolescent Health and Academic Achievement (AHAA) project, they now include high school transcripts that allow more detailed measurement of academic status than was previously possible.

THEORY AND EVIDENCE

Drinking in the Early Life Course

Despite evidence of the health benefits of moderate alcohol use, adolescent drinking is still cause for considerable concern because it is more likely to be excessive, lead to accidents, and disrupt adjustment (Crosnoe, Frank, and Muller 2004; Schulenberg and Maggs 2002; Aseltine and Gore 2000; Hawkins, Catalano, and Miller 1992). The life course perspective provides a lens through which to view this public health problem.

In the life course, behavior is largely determined by the norms, expectations, and constraints that characterize the age grades, networks, and institutions inhabited by an individual. Also important are transition points, which are major changes in setting, role, or stage. Because a transition involves change in personal or social circumstances, it can either alter or reinforce behavior (Shanahan 2000). For example, some circumstances foster drinking while others constrain it. At any given time, therefore, young people will likely exhibit different rates of drinking if they experience different life circumstances and if they undergo key transitions in systematically different ways (Schulenberg et al. 2003; Bachman et al. 2002).

Illustrating this phenomenon, adolescents surveyed for the Monitoring the Future project who planned to attend college drank less than their peers during high school but more than they did after graduating from high school, primarily because they enrolled in college (Schulenberg et al. 1994). This pattern likely arose because the constraints on drinking that such students faced as they aimed to get into college disappeared once they achieved their goal, only to be replaced with increased opportunities for drinking once they entered college. The present study uses this pattern as the foundation for an education-focused life course treatment of drinking across the transition to young adulthood by: (1) drawing on official transcripts to assess different ways of being a good student in high school, (2) exploring possible mechanisms by which the association between academic status and drinking behavior changes over time, and (3) investigating how these patterns vary as a function of the peer norms of the high schools in which academic status is accrued.

Education and Drinking Behavior

Typically, drinking increases steadily from adolescence to young adulthood, but this general pattern subsumes some variation (Bachman et al. 2002; Schulenberg and Maggs 2002). This variation, we argue, is related to high school academic status, which imposes constraints on and provides opportunities for adolescents' drinking and then influences the contexts that they enter as young adults.

To gauge academic status, this study improves upon the useful, but simplistic, measures typical of *health* research (e.g., self-reported grades, college plans) by drawing on a valuable resource in *educational* research. Official school transcripts record two primary ways in which students academically excel in high school: grades and course-taking. The first category taps students' ability to meet teachers' expectations for appropriate levels and kinds of behavior and attitude as well as their choices about how much effort to exert in meeting these expectations (Rosenbaum 2001; Moreno and Muller 1999; Farkas et al. 1990). Thus, students' cumulative grade-point average (GPA) is a widely recognized, easily interpretable, official summary of their school careers that becomes a major factor in both college enrollment and labor market entry (Lee, Smith, and Croninger 1997; Stevenson, Schiller, and Schneider 1994).

The second dimension, course-taking level, goes beyond grades to gauge students' location in the curricular hierarchy of their schools and their exposure to challenging work. For example, high school students are generally required to take three years of math, which can be accomplished by taking general courses (e.g., Algebra I, Geometry). Some students, however, go beyond minimum requirements to take more demanding courses (e.g., Calculus). These students occupy a tangibly elite academic position. Thus, advanced math course-taking is one of the best predictors of postsecondary enrollment—more so than educational expectations that often prove unrealistic or grades that are divorced from course work—as well as entry into the most selective colleges (Riegle-Crumb 2003; Schneider 2003; U.S. Department of Education 2003; Schneider, Swanson, and Riegle-Crumb 1998). Although students who take advanced courses likely make good grades, some maintain grades only high enough to receive class credit. Conversely, many students in general-level courses also maintain high GPAs. Recognizing the distinct ways in which academic status can be accrued, therefore, is important.

Prior to the transition to young adulthood, these academic markers should be *inversely* associated with drinking behavior. In high school, increases in academic status couple with decreases in opportunities to drink (e.g., pro-drinking peers), increases in controls against drinking (e.g., fear of angering parents or losing school standing), and increases in psychological resources (e.g., efficacy) that enhance resistance to negative temptations (Crosnoe 2006; Jessor, Donovan, and Costa 1991). These inverse associations are the "given" in this study.

Post-transition, these markers should be *positively* associated with drinking behavior for two reasons. First, academic status in high school helps to determine the contexts in which students will spend young adulthood. Higher-status students will be more likely to enter college after high school. Ample evidence suggests that college life fosters social drinking (O'Malley and Johnston 2002; Straus and Bacon 1953). At the same time, a primary reason for the college effect in Monitoring the Future was the tendency for college students to live with other young people rather than their parents (Bachman et al. 1997). Thus, students who do well in high school will enter an environment that presents many opportunities to drink and that often exacts social costs for not drinking. In contrast, students of lower academic status will be more likely to enter the labor force as well as early marriage and parenting roles, all of which curtail time available for partying and increase the social and economic costs of drinking-related problems. Thus, students who do poorly in high school will enter contexts with fewer opportunities for

and greater constraints on drinking (Bachman et al. 2002; Bachman et al. 1997; Warr 2002; Jessor et al. 1991).

Second, academic status in high school likely creates expectations for the parameters of appropriate behavior in young adulthood and beyond. In other words, academically elite students are on a pathway to higher socioeconomic status as adults. Given the link between drinking and social class behavior, they may internalize norms that drinking is integral to both the transition to young adulthood and to high-status adult lifestyles (Diala, Muntaner, and Walrath 2004; O'Malley and Johnston 2002; Vaillant 1983). Importantly, these expectations could affect young adult behavior independently of college enrollment.

Consider, for example, two male students, one of whom earns good grades in advanced math in high school and the other of whom earns poor grades and has dropped out of math. During high school, the first student will probably have less exposure to peer groups promoting drinking; regardless, he will be less likely to risk his academic standing by drinking. After high school, he will likely leave home for a college campus where drinking is more prevalent and normative. Even if he does not attend college, he still could follow the behavioral norms for what the transition to young adulthood is supposed to entail. On the other hand, the latter student will likely face greater social costs from not drinking (e.g., exclusion from party crowds) and lower academic costs from drinking (e.g., no academic successes to jeopardize) during high school, but he will then likely leave high school for a more adult life that regulates drinking. In the end, the normative upswing in drinking across the transition to young adulthood will be more pronounced for the former than the latter, resulting in the hypothesized reversal at the center of this study.

High School Contexts of Drinking Patterns

Central to life course research is the principle that social contexts enact barriers to, up-hold norms for, and attach meaning to behavior (Elder et al. 2003). Depending on the context of origin, therefore, the transition to young adulthood can mean different things and lead to different outcomes. Specifically, the potential reversal of the association between academic status and drinking behavior across this transition may vary in degree across particular contexts of American adolescence. In line with our educational focus, this study considers school context, particularly its power to organize peer culture (Moody 2001).

More than just a formal organization of instruction, a high school is also a collection of people who come together for extended periods to construct intricate systems of norms and values. Just as schools can be characterized as good or bad in terms of structure and function, they can be characterized by their student cultures. The student cultures of academically oriented schools favor achievement and preparation for college, while the student cultures of socially oriented schools emphasize partying and fun (Crosnoe et al. 2004; Coleman 1961). Clearly, these two types of schools provide distinct socializing contexts, one erecting barriers to drinking and the other far more hospitable to it. Moreover, school culture can shape drinking behavior even after students have left the school. First, the norms internalized during high school—such as the belief that drinking is cool versus viewing it as dangerous—shape how students approach young adulthood. For example, students graduating from a "party" high school likely have more favorable views of drinking before and after graduation, regardless of their academic status. Second, there may be significant variation in how schools define student success. For example, a given student may be among the academic elite in a more socially oriented high school, but if the same student were to attend a more academically rigorous high school, he or she might only make it to the middle of the pack. Thus, the specific peer norms in any given school qualify the general status attached to good grades and advanced math course work and, therefore, their associations with drinking before and after high school.

In summary, this study takes an education-focused life course perspective on the normative increase in drinking behavior across the transition to young adulthood. It is structured by two research questions. First, will this increase be greater among students at the high end of the academic hierarchy in high school, thereby resulting in a reversal in the direction (negative to positive) of the association between academic status and drinking behavior? Second, will the degree of this reversal vary according to the emphasis placed on academic success or party-culture behavior in the peer contexts of high schools in which academic status is accrued?

METHODS

Data and Sample

This study combined data from Add Health and its matched transcript study, AHAA. Add Health is a nationally representative sample of 7th–12th graders in 1995 (Bearman, Jones, and Udry 1997). Sample schools were selected with a stratified design, based on region, urbanicity, sector, racial composition, and size. Most schools contained 9th–12th grades, with some also containing 7th and 8th grades. All schools not containing 7th and 8th grades were then randomly matched to one middle school that fed into them, with the probability of the feeder school being selected proportional to its student contribution to the high school. The final sample included 132 schools. During the 1994–1995 school year, nearly all students in the sample schools completed the short "In-School Survey" in order to create a sampling frame for later, more intensive rounds of data collection. Of these 90,118 students, a subgroup selected evenly across high school–feeder school pairs participated in the In-Home Interview between April and December 1995 (wave 1; $n = 20{,}745$). Attempts were then made to follow up all wave 1 respondents, except for those who had been seniors in high school, between April and September 1996 (wave 2, $n = 14{,}738$). Finally, attempts were made to follow up all wave 1 respondents, including seniors, between August 2001 and April 2002 (wave 3, $n = 15{,}197$), when they were ages 18–26. Approximately 77 percent of the original wave 1 sample participated in wave 3.

Second, AHAA added detailed educational data for the Add Health respondents (see Muller 2005). At the same time as the wave 3 In-Home Interview, sample members were asked to complete a high school Transcript Release Form that authorized study personnel to collect the students' official transcripts from the last schools they had attended. Westat Corporation, the research firm that collected the transcripts, eventually collected transcripts for more than 13,000 young people.

The sample for the present study was constructed by applying three selection filters to the wave 1 sample. The first limited the sample to 14,752 wave 1 high school students, defined as those enrolled in grades 9–12 (including a small number of 9th graders in middle schools). This filter was necessary because of the multicohort design of Add Health. In this design, the transcripts (collected only from high schools) could have preceded, overlapped with, or followed the wave 1 In-Home Interview. Focusing on wave 1 high school students, therefore, ensured that all wave 1 behavioral measures were taken from the same time as the transcripts. The second filter limited the sample to the 8,720 wave 1 high school students who remained in the Add Health sample through wave 3 and also had transcripts collected. This filter was necessary because all of the data used in this study were culled from the waves 1 and 3 In-Home Interviews or the transcripts, which were also collected at wave 3. The third filter limited the sample to the 6,038 wave 1 high school students with valid transcripts who also had a sampling weight assigned to them. Sample weights correct the un-equal probability of selection into the Add Health sample—a result of the oversampling of special populations of interest already mentioned—by essentially discounting the representation of those specially sampled cases in the final sample. The weights also accounted for nonrandom attrition across waves (Chantala and Tabor 1999). Unfortunately, sample weights were not calculated for students in two high

schools or for adolescents who were added to the sampling frame (to fill the oversamples) after the weights were calculated.

Comparing the 6,038 students in this final study sample to the wave 1 high school students excluded from this sample because of one of the selection filters revealed that the former had a significantly higher proportion of whites with college-educated parents than the latter. Young people in this sample also had slightly lower mean levels of drinking.

Measures

Drinking behavior—In wave 3, respondents were asked a filter question about drinking (1 = yes, 0 = no): "Since June 1995, have you had a drink of beer, wine, or liquor more than two or three times? Do not include sips or tastes from someone else's drink." Those who responded affirmatively were then asked several more questions. One question was, "During the past 12 months, on how many days did you drink alcohol?" Another question was, "During the past 12 months, on how many days did you drink five or more drinks in a row?" Responses for both questions included 0 (none), 1 (one or two days during the past 12 months), 2 (once a month), 3 (two or three days a month), 4 (one or two days a week), 5 (three to five days a week), and 6 (every day or almost every day). Following Add Health convention (see Resnick et al. 1997), responses to the first question measured the frequency of drinking in the past year, and responses to the second measured the frequency of binge drinking in the past year. Both measures ranged from 0 to 6, with all respondents who answered no to the filter question in the 0 category. The same protocol was followed to measure drinking and binge drinking at wave 1.

Past research (Crosnoe et al. 2004; Chassin et al. 1999) has demonstrated that the effects of alcohol use are often nonlinear, with some increases in alcohol use more important than others. Thus, this study dichotomized these quasi-continuous measures: current drinking (1 = drank alcohol once a month or more in the past year, 0 = drank alcohol less than once a month or not at all) and binge drinking (1 = drank more than five drinks in one sitting at least once in the past year, 0 = did not drink more than five drinks in one sitting in the last year even if did drink).

Rates of these two behaviors (see Table 1 for descriptive statistics) were somewhat low compared to other data sources (e.g., Monitoring the Future), a common issue when studying drinking with Add Health. This difference could have arisen because of underreporting due to the in-home nature of the interviews. Yet in-home reports actually slightly exceeded the in-school reports from earlier in the same year, which suggests that the setting of the data collection was not a problem. Other explanations include differences in question wording or the presence of younger adolescents in Add Health. Regardless of the explanation, these apparently underreported rates of drinking no doubt make the statistical estimates of this study conservative.

Academic status—The first dimension of academic status was math course-taking level. Because the math curriculum in American secondary education is largely standardized into a hierarchy of classes from less advanced to more advanced, the AHAA transcripts were used to create variables measuring location in the math-course sequence for each year of high school as well as the ultimate level achieved by the end of high school (Riegle-Crumb et al. 2005). Coding schemes were similar to those previously applied to the National Educational Longitudinal Study (Schiller and Hunt 2001; Schneider et al. 1998). Each math class on a transcript was assigned a "Classification of Secondary School Courses" code designating the course subject, using the standard taxonomy created for all National Center of Education Statistics data sets. These codes were collapsed into ten hierarchically ordered categories (0 = no math; 1 = Remedial Math; 2 = General Math; 3 = Pre-Algebra; 4 = Algebra I; 5 = Geometry;

6 = Algebra II; 7 = Advanced Math, including Algebra III and Statistics; 8 = Pre-Calculus; and 9 = Calculus). For this study, we used the indicator of how far students had advanced in the math curriculum by the end of high school to measure math course-taking level. For example, a value of 8 on this variable indicated that a student finished his or her math course work with Pre-Calculus.

The second dimension was GPA. Student transcripts gave the letter grade earned by students in each course of the high school career, which were averaged across classes and semesters to calculate a comprehensive GPA ranging from 0 (failure) to 4 (A). This measure captures students' successful efforts to meet performance expectations, as opposed to the course-taking measure, which captures their successful navigation of the academic curriculum. Not surprisingly, the correlation between the two measures is moderately strong ($r = .62, p < .001$). Thus, our measures capture related but distinct dimensions of academic status in high school, each with different implications for behavior after high school.

Young adult life circumstances—Wave 3 reports were collapsed into a set of seven dummy variables for highest educational status: (1) dropped out of high school, (2) graduated from high school (including the small number still enrolled in high school), (3) dropped out of two- or four-year college, (4) currently enrolled in two-year college, (5) graduated from two-year college, (6) currently enrolled in four-year college, and (7) graduated from four-year college. Next, a series of relationship items were collapsed into a set of three dummy variables: (1) married, (2) cohabitating, and (3) single. A series of items on paid employment were collapsed into a set of three dummy variables: (1) working full time (20–40 hours), (2) working part time (1–20 hours), and (3) not working. Finally, a dummy item of living status designated whether young people lived with their parents (coded 1) or not (0).

School context—Individual responses in wave 1 can be aggregated within schools to create school-level measures. Our academic status measures were aggregated into variables—mean cumulative GPA and mean math course-taking—tapping academically oriented schools, allowing us to separate the effects of the academic context of schools from the effects of students' own academic status. Additionally, our two drinking measures were aggregated into variables—mean regular drinking and mean binge drinking—tapping socially oriented schools. Another dimension of school social context was mean risk behavior, aggregated from an individual-level composite consisting of the average of three standardized items: (1) cigarette use (a count of days on which the adolescent had smoked in the last month), (2) marijuana use (a seven-point frequency, ranging from none to every day), and (3) risky sex (1 = had unprotected sex in the past year, 0 = did not have unprotected sex or did not have sex at all).

Control variables—Six sociodemographic factors were included in multivariate analyses: (1) gender (1 = female, 0 = male), (2) wave 1 grade level (a proxy for age), (3) race/ethnicity (dummy variables for white, African American, Hispanic American, Asian American, other), (4) parent education (1 = at least one parent graduated from college, 0 = neither parent graduated from college), (5) family structure (1 = two biological parents, 0 = other family form), and (6) athletic status (1 = student had participated in at least one school sport, 0 = no such participation). The last item was created to control for the simultaneously high achievement and alcohol use of high school athletes (Crosnoe 2002). Additionally, three school-level controls were also used: (1) proportion of African American students in the student body, (2) proportion of Latino/as in the student body (both calculated from school rosters), and (3) proportion of college-educated parents of children in the school (created by aggregating the parent education measure just described).

Plan of Analyses

The multivariate analyses in this study proceeded in three steps. First, we regressed *each* wave 3 outcome on the controls, the wave 1 measure of the outcome, math course-taking, and cumulative GPA to gauge the associations between academic status during high school and drinking behavior after high school. Second, we added the educational and family/work life circumstances to the model to explain these associations. Third, we introduced the three school-level controls and five measures of the academic and social norms of high schools to predict the student-level intercept and slopes. This final step gauged the degree to which the average level of drinking behavior (intercept) and the associations between academic status and drinking behavior (slopes) varied as a function of multiple dimensions of high school context.

The analyses in this study were conducted with hierarchical linear modeling (HLM), which computes robust standard errors to account for the correlated error terms of Add Health students within the same schools and also allows the weighting of data with the cross-wave sample weight. Although other statistical packages deal with school clustering, HLM also allows the estimation of associations between school-level predictors and individual-level outcomes (e.g., mean math course-taking in the school predicting current drinking) as well as the effects of school-level variables on the slopes of individual-level predictors (e.g., mean math course-taking in the school moderating the association between individual math course-taking and current drinking). Thus, HLM was critical to our analytical plan, especially the third step. We used HLM Bernoulli modeling for the two binary out-comes. In these models, individual students were the level 1 units of analysis, and high schools were the level 2 units. All variables were grand-mean centered, which increased the numerical stability of the HLM technique and ensured that the intercept of each model represented the predicted outcome for a student who was average on all characteristics in the model (Bryk, Raudenbush, and Congdon 2002).

RESULTS

Academic Status and Drinking Behavior during High School

In high school, students are distributed across a continuum of academic status and drinking behavior. Approximately 11 percent of the study sample had reached Calculus by the end of high school, 23 percent had reached Pre-Calculus, 6 percent had reached Advanced Math, and 24 percent had reached Algebra II. Thus, nearly one-third of high school students had not reached the level of math (Algebra II) that is considered the most meaningful distinction between students prepared and unprepared for college (Adelman 1999). As for grades, the average student finished high school with a cu-mulative GPA of 2.74, or a C+, with considerable variation around this mean. In general, about one-fifth of high school students drank at least monthly, and nearly one-third reported binge drinking at least once in the past year (refer back to Table 1). As the young people in this sample moved into young adulthood, however, these two proportions increased sharply.

Of course, this study was interested in the *connection* between academic status and drinking. Table 2 presents wave 1 drinking frequencies by academic status. These frequencies were broken down by grade level because of the time overlap of Add Health and AHAA. Wave 1 occurred in the spring of 1995 for multiple cohorts. Freshmen at wave 1, therefore, would have answered questions on initial drinking in 1995, but their high school transcripts would have run from 1995–1999. On the other hand, seniors at wave 1 would have answered questions on initial drinking in 1995, but their transcripts would have run from 1992–1995. Thus, the measure of initial drinking would largely precede academic markers in one group and follow them in the second. Grade-level statistics at least give some picture of the consistency of patterns for different time orderings. Indeed, the associations between academic statuses and drinking behaviors demonstrated remarkable consistency. Within each grade, a greater

proportion of low-academic-status students engaged in both drinking behaviors. Therefore, these statistics largely confirmed expectations that, during high school, successful students drank less.

Academic Status in High School and Current Drinking after High School

The key argument of this study was that the negative association between academic status and drinking behavior during high school would reverse directions after high school. Thus, we turned to nonlinear HLM to determine whether this reversal occurred for two different dimensions of drinking behavior, whether it was explained by young adult life circumstances, and whether it varied as a function of high school context. Table 3 presents the first set of multivariate logistic regression models for current drinking after high school.

According to model 1, both markers of high school academic status predicted the current drinking outcome, net of sociodemographic characteristics, as well as high school drinking status ($b = .10$, $p < .001$ for math course-taking in model l, $b = .18$, $p < .01$ for GPA). Among students with the same current drinking status in high school (wave 1), the odds of being a regular drinker after high school (wave 3) rose by about 10 percent with every notch up the math course-taking sequence during high school and by about 20 percent with every .1 increase in cumulative GPA during high school.

These associations between high school academic status and the likelihood of becoming a current drinker after high school were explained to varying degrees by life circumstances in young adulthood. In general, those who continued their educational careers after high school, especially in four-year colleges, were more likely to become current drinkers than their peers who finished their academic careers with high school or who dropped out of high school (model 2). The inclusion of these post–high school educational status markers reduced the magnitude of the coefficient for GPA to virtually zero and brought it to non-significance. The observed association between high school GPA and increases in the odds of being a current drinker, therefore, was completely explained by college entry. Accounting for post–high school educational status also resulted in an almost 45 percent reduction in the math course-taking coefficient between model 1 and model 2 (approximately one-tenth of a standard deviation in the outcome). Unlike GPA, however, this coefficient remained statistically significant. Finally, living at home and marriage predicted the current drinking outcome (model 3), but cohabitation and employment status did not. The inclusion of these family and work markers did not alter the coefficients for the two measures of academic status.

To gauge the magnitude of these associations, we calculated the predicted odds of wave 3 alcohol use for students who reached different levels of math course-taking by the end of high school, holding all sociodemographic characteristics and young adult life circumstances to their sample means. Doing so revealed that students who only advanced to Geometry or Algebra II had less than even odds of becoming a regular drinker after leaving high school (odds = .47 and .48, respectively), but students who advanced into the most demanding math course work (e.g., Pre-Calculus, Calculus) had better than even odds of doing so (odds = .52 and .53, respectively). The most elite students, therefore, were more likely than not to become regular drinkers after high school, even after accounting for their college attendance and living situation.

It is worth emphasizing that, given the control for wave 1 current drinking status, these models essentially estimated continuity and change in current drinking status between waves 1 and 3. Thus, compared to their peers, higher-academic-status students were more likely to *become* current drinkers, given that they had formerly had a level of drinking below the threshold for current drinking during high school (wave 1) and then increased their drinking to the point of crossing that threshold after high school (wave 3). However, they could still could be less likely

to be regular drinkers after high school. The difference here is between changes in the odds of drinking and the overall odds of drinking. For example, higher-academic-status students could be more likely to change from not being a current drinker to being a current drinker over time because they had more "room to move" compared to lower-status students, but they could still be less likely to be a current drinker at any one time. Ancillary analyses, in which model 3 was reestimated without the wave 1 current drinking status measure, revealed that the coefficient for math course-taking remained significant and positive (results not shown). Thus, academically successful students did overtake their peers in terms of their odds of current drinking after high school.

Next, did this association between math course-taking and increasing odds of current drinking vary as a function of the characteristics of the schools in which this course-taking occurred? Table 4 presents the results of two-level models that added school characteristics as predictors of the intercept of current drinking (i.e., school characteristics predicting the probability of drinking for an adolescent who was average on all factors in the model) and of the slope for math course-taking (i.e., school characteristics predicting the degree of association between math course-taking and current drinking). Mean rate of regular drinking in the student body and the proportion of college-educated parents in the school both positively and significantly predicted the intercept. Proportion of African American students in the school negatively predicted the intercept. Thus, students coming from high schools with higher African American enrollments were less likely to be current drinkers during young adulthood.

One demographic school characteristic and one academic school characteristic predicted the slope for math course-taking (no social school characteristics predicted the slope for math course-taking). First, the association between math course-taking and changes in the odds of being a current drinker increased as the proportion of college-educated parents in the school increased. Second, and more important for the purposes of this study, mean cumulative GPA also predicted this slope ($b = -.35$, $p < .01$). The negative coefficient indicates that the positive association between level of math course-taking and drinking *decreased* as school GPA *increased*.

For interpretation of this interaction term, we calculated the predicted odds of regular drinking for students who ended high school having completed different levels of math (Calculus, Pre-Calculus, Algebra II, Geometry) in schools that varied in the average GPA of students (measured as standard deviations from the mean). The results indicated that, in general, students taking the most advanced math courses (Pre-Calculus and Calculus) in high school were in fact more likely to become current drinkers after high school. For example, the odds for Calculus students were generally around .60 in most schools, but the corresponding odds for Geometry students were typically around .45. This exception to the general rule occurred in schools with a very high average student GPA (measured as two standard deviations above the mean). In this case, the odds favored the lower-status students (odds = .49 for Geometry students) rather than the higher-status students (odds = .40 for Calculus students). The reversal in the association between high school academic status and post-high school drinking, therefore, did not hold among students coming out of the most academically competitive schools.

Academic Status in High School and Binge Drinking after High School

Switching the dependent variable in these logistic models from regular drinking to binge drinking revealed quite similar results, so they will be summarized briefly. First, math course-taking during high school was associated with greater odds of becoming a binge drinker after high school, but cumulative GPA was not. Second, this longitudinal association was attenuated, but not eliminated, by educational, family, and work circumstances. Third, mean binge drinking in the school (a positive effect) and proportion of African American students in the

school (a negative effect) were the only school characteristics that predicted the intercept for binge drinking in young adulthood, net of other factors and wave 1 binge drinking. Fourth, mean cumulative GPA (a positive effect), proportion of African American students (a negative effect), and proportion of Latino/a students (a negative effect) were the only school characteristics that predicted the slope for math course-taking.

CONCLUSION

Like many behaviors, alcohol use rises and falls in conjunction with the constraints, pressures, and opportunities of different life stages, roles, and contexts. Educational attainment is also a pathway—the gradual navigation of a system, in fits and starts, over time. These two longitudinal phenomena connect in ways that have a pronounced effect on the early life course. This study investigated this connection in an effort to shed light on the social construction of alcohol use.

To summarize our findings, advanced math course-taking, independent of grades, was generally associated with lower odds of being a current or binge drinker during high school but higher odds of becoming a current or binge drinker after high school. This pattern represented a reversal of fortune for students on different ends of the academic hierarchy, with higher-academic-status students overtaking lower-status students in both relative and absolute terms. This reversal was also socially embedded. It was, at least in part, a function of the greater tendency for higher-academic-status high school students to eventually enroll in institutions of higher education, move out of their parents' homes, and delay marriage. At the same time, this reversal was less pronounced in schools with more academically oriented peer contexts. Thus, the transition to young adulthood was a turning point that differed qualitatively across different segments of the student population. This turning point represented a developmental disturbance for higher-status high school students, especially those coming out of schools in which students were relatively unfocused on academic pursuits. For other students, it represented a knifing-off point (Schulenberg et al. 2003).

Recall that the starting point of this study was life course research on the connection between education and drinking using the Monitoring the Future data set (e.g., Bachman et al. 1997; Schulenberg et al. 1994). That line of research has reported two key findings: (1) a negative association between perceived GPA and drinking before and after high school, and (2) a negative association between college aspirations and drinking during high school that becomes positive after high school, with this positive association completely explained by actual college attendance and post–high school living situation. Despite a clear problem with underreporting of substance use, the combination of Add Health and AHAA provides better measurement of academic status and allows the consideration of high school context, which enabled us to reveal new, different information that extended this valuable line of research.

First, replacing the perceptual GPA measure with official GPA and math course-taking level resulted in one difference. The Monitoring the Future research found that students with good grades drank less than their lower-achieving peers both *during and after* high school, suggesting that these students were overly controlled and always followed the rules. In our study, students who made better grades drank *less* than their peers *during* high school but *more* than their peers *after* high school. Similar to the college-aspirations effect in the past study, this post–high school GPA effect obtained due to students leaving home and entering college. The control explanation still holds, therefore, but only if we expand the concept of following the rules to include social rules. For example, drinking is formally prohibited in high school, so following the rules would imply not drinking. In college, the norms in favor of drinking probably outweigh legal or institutional sanctions against drinking, so following the rules would imply drinking. If so, these controlled, high-achieving students demonstrate

consistency in motivation and influence across the transition to young adulthood even though their actual behavior changes dramatically.

Second, replacing the college-aspirations measure with math course-taking level revealed that the reversal in the association between high school academic status and drinking status across the transition into young adulthood *could not* be explained solely by college enrollment, living situation, or other young adult life circumstances. In other words, high school academic status had a carry-over effect on young people even after they left high school, regardless of the contexts they entered after high school. In general, students who reached the highest levels of math in high school—the students identified by educational researchers as the academic elites —were less likely than their peers to be drinkers during high school and more likely to be or to become drinkers after high school. Their post–high school increase in drinking was partly a function of their transition from high school to college, but academically elite students demonstrated this increase independently of whether they went to college. Those who did not attend college may have cultivated a model of what young adulthood and adulthood entail for "people like them," a model that included drinking: party drinking in young adulthood, and social drinking (happy hours, cocktail parties) in adulthood. This model, then, shaped their drinking regardless of their actual life circumstances.

Third, this study revealed that the *general* reversal of the association between academic status and drinking across the transition to young adulthood in Monitoring the Future and replicated here occurred in most schools, but not all of them. Specifically, high-level math students in less competitive or moderately competitive high schools demonstrated the most pronounced increases in the odds of drinking over time, but similar students in the most competitive high schools did not. In other words, the general academic norms of the high school conditioned the significance of any given student's academic status. This finding could arise because the socialization of students in the most competitive schools made a lasting, enduring impression on them. Another possibility is that the colleges into which these students eventually entered were also highly competitive and thus less likely to be characterized by cultures of drinking. A final possible explanation is that students who select into competitive high schools have characteristics that also affect their tendency to drink. Regardless of the explanation, what matters are *academic* norms, not norms about drinking or partying. All in all, these school findings support the value of thinking about the connection between schooling and drinking as context-specific.

Thus, this study has revealed that the academic position of individual students and the normative and demographic (e.g., racial/ethnic composition) contexts of their high schools strongly affect drinking behaviors. This academic position is captured by official institutional records, not self-perceptions or assessments, and represents a concrete level of achievement in an academic hierarchy that introduces controls and creates opportunities in the present and future. Furthermore, schools are socializing contexts populated by peers who come together to collectively figure out behavioral rules. Life in this context shapes drinking in two key ways: (1) assigning status to drinking in the short term, and (2) influencing which experiences are in store for students in the long-term. Interestingly, given that those post–high school experiences did not completely explain the association between high school academic status and later drinking behavior, the socializing role of high school social contexts (as well as demographic compositions of schools) apparently has a carry-over effect on the drinking behavior, even after students have exited that specific context.

Just as we have built on the Monitoring the Future research, future studies should build on what has been done here. One future need is a fuller incorporation of peer culture. We have tapped peer norms by the general characteristics of students in schools. A more micro-level focus (e.g., network techniques that gauge the norms of friends and romantic partners during

and after high school), however, would be valuable. For example, the peer networks that form at the high end of the high school academic hierarchy may be a precursor of the young-adult culture characterizing many college campuses. Adolescents in these networks look forward to the college years that seem a foregone conclusion, and, like so many college students, view these years as a time to drink and party. As an-other example, consider the higher-status high school students who do not enter college after graduating from high school. Some might have turned to drinking as self-medication, some might have simply followed their expected pattern of drinking even if they did not enter college, and still others might have been introduced to higher levels of drinking by their high school friends who did enter college. Thus, the peer world can contribute in many ways to this observed pattern of drinking among higher-status students.

Another pressing future need is careful consideration of the young-adult period. Understanding the social and academic contexts of college will offer an important insight into young adulthood, just as understanding the corresponding contexts of high school has elucidated the experience of adolescence. Of course, the contexts of young adulthood go beyond college, so we also need to do a better job of examining the aspects of early marriage, employment, and changing parent-child relationships that shape young-adult experiences. Finally, past life course research on drinking (Bachman et al. 1997) has documented a gradual decline in drinking throughout the 20s and into the 30s. This pattern suggests the possibility that the reversal in the association between academic status and drinking during the transition to young adulthood is followed by yet another reversal—wherein the high-status high school students eventually fall below their former peers once again—as adulthood progresses.

Building this literature is an important endeavor because, even though it is focused on a specific health behavior at a specific stage of life, this line of research captures the place of health in the life course. Any given setting conveys norms, values, and opportunities that influence— both directly and in interaction with individual agency—the behavior and adjustment of individuals, which, in turn, has implications for the settings they will transition into later in life. These settings, in turn, influence their current and future behavior in similar ways. Through this sequence of settings, events, and experiences, life course pathways are created.

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Biographies

Robert Crosnoe is main field of interest is the life course and human development, with a special emphasis on social-psychological approaches to educational and health issues and how they can illuminate demographic inequalities. His current work focuses on the role of general developmental processes, including health and social relationships, in the educational experiences of young people, especially immigrant youth and poor youth.

Catherine Riegle-Crumb is currently working on a project that examines how social contexts influence both racial/ethnic and gender disparities in educational achievement. Her research also focuses on the link between high school achievement and postsecondary matriculation and the factors that encourage minority and female students to pursue science, technology, engineering, and math fields in college.

TABLE 1

Descriptive Statistics for All Study Variables (N = 6,038)

	M or %	SD
Drinking behaviors		
Wave 1 current drinking status	18.08%	—
Wave 3 current drinking status	48.67%	—
Wave 1 binge-drinking status	31.55%	—
Wave 3 binge-drinking status	53.23	—
High school academic status		
Math course-taking	6.14	1.94
Cumulative GPA	2.74	.63
Young-adult life circumstances		
Dropped out of high school	5.12%	—
Graduated from high school	29.58%	—
Dropped out of 2/4-year college	14.38%	—
Currently enrolled in 2-year college	9.39%	—
Graduated from 2-year college	5.45%	—
Currently enrolled in 4-year college	20.95%	—
Graduated from 4-year college	15.12%	—
Married	17.26%	—
Cohabiting	15.65%	—
Single	67.09%	—
Working full time	53.26%	—
Working part time	20.87%	—
Not working	25.84%	—
Living with parents	39.37%	—
School context characteristics		
Mean math course-taking	6.24	.76
Mean cumulative GPA	2.74	.23
Mean regular drinking	.19	.06
Mean binge drinking	.32	.11
Mean risk behavior	.04	.18
Proportion African American	16.94	20.93
Proportion Latino/a	18.35	21.49
Proportion college-educated parents	34.10%	—
Sociodemographic characteristics		
Female	51.70%	—
White	52.65%	—
African American	18.83%	—
Latino/a	17.17%	—
Asian American	8.71%	—
Other race/ethnicity	2.60%	—
Family structure (two-parent)	57.17%	—

	M or %	SD
Parent education (college graduate)	37.55%	—
Athletic status (athlete)	42.40%	—

TABLE 2

Proportion of Drinkers by Level of Math Course-Taking and Cumulative GPA, within High School Grade Levels (N = 6,038)

	% Drinkers by Math Course-Taking and Cumulative GPA	
	Current Drinking Status	**Binge-Drinking Status**
9th grade		
Low math course-taking	16.40_a	31.39_a
Medium math course-taking	12.25_a	$22.40_{a,b}$
High math course-taking	9.09_a	20.83_b
10th grade		
Low math course-taking	21.95_a	40.79_a
Medium math course-taking	$16.53_{a,b}$	29.70_b
High math course-taking	14.03_b	20.18_c
11th grade		
Low math course-taking	31.62_a	49.69_a
Medium math course-taking	20.08_b	35.36_b
High math course-taking	16.71_c	27.97_c
12th grade		
Low math course-taking	35.21_a	49.23_a
Medium math course-taking	$27.45_{a,b}$	30.37_a
High math course-taking	21.34_b	40.00_a
9th grade		
Low GPA	18.69_a	24.78_a
Medium GPA	13.28_b	24.61_b
High GPA	5.87_c	10.76_c
10th grade		
Low GPA	27.41_a	38.91_a
Medium GPA	16.76_b	32.40_b
High GPA	8.89_c	16.05_c
11th grade		
Low GPA	28.44_a	47.41_a
Medium GPA	22.49_b	38.46_b
High GPA	11.61_c	20.31_c
12th grade		
Low GPA	31.58_a	51.02_a
Medium GPA	29.75_a	45.39_a
High GPA	18.52_b	26.00_b

Notes: For each academic status variable, the low category includes all students scoring one standard deviation below the mean or lower, the medium category includes all students scoring within one standard deviation of the mean, and the high category includes all students scoring one standard deviation above the mean or higher. Frequencies with the same subscript (within each column for each grade level) did not differ significantly,

according to one-way ANOVA. Frequencies with different subscripts did differ significantly, with "a" representing largest frequency, "b" the next largest, etc.

TABLE 3

Results from Logistic Models Predicting Wave 3 Current Drinking by High School Academic Status and Young Adult Life Circumstances (N = 5,686)

	Model 1		Model 2		Model 3	
	b	SE	b	SE	b	SE
Intercept	−.053	.060	−.051	.059	−.059	.055
High school academic status						
Highest math sequence	.102***	.027	.063*	.029	.056*	.029
Cumulative GPA	.175**	.074	.023	.072	.052	.074
Sociodemographic characteristics						
Female	−.836***	.064	−.856***	.063	−.799***	.059
Wave 1 grade level	−.059	.049	−.110*	.049	−.054	.055
African American[a]	−.642***	.149	−.700***	.152	−.802***	.147
Latino/a	−.318*	.169	−.296	.171	−.277	.159
Asian American	−.975***	.233	−.949***	.241	−.979***	.240
Other race/ethnicity	−.243	.199	−.220	.203	−.240	.204
Family structure (two-parent)	.002	.076	−.029	.078	−.018	.079
Parent education (college graduate)	.098**	.037	.059	.039	.050	.037
Wave 1 athletic status	.328***	.084	.301***	.086	.302***	.086
Wave 1 current drinking	.594***	.108	.582***	.112	.583***	.116
Young adult life circumstances						
Dropped out of high school[b]	—	—	−.687***	.204	−.690**	.218
Dropped out of 2/4-year college	—	—	.238*	.125	.181	.128
Currently enrolled in 2-year college	—	—	.166	.159	.058	.161
Graduated from 2-year college	—	—	−.057	.155	−.124	.160
Currently enrolled in 4-year college	—	—	.422**	.136	.319*	.155
Graduated from 4-year college	—	—	.741***	.164	.603***	.163
Married[c]	—	—	—	—	−1.162***	.126
Cohabiting	—	—	—	—	−.166	.130
Working full time[d]	—	—	—	—	.121	.094

	Model 1		Model 2		Model 3	
	b	SE	b	SE	b	SE
Working part time	—	—	—	—	.039	.105
Living with parents	—	—	—	—	−.234**	.086

*
$p < .05$;

**
$p < .01$;

***
$p < .001$

[a] White was the reference category for the race/ethnicity dummy variables.

[b] High school graduate was the reference category for the educational dummy variables.

[c] Single was the reference category for the family dummy variables.

[d] Unemployed was the reference category for the work dummy variables.

TABLE 4

Results from Logistic Models Predicting Wave 3 Current Drinking by High School Academic Status, Young Adult Life Circumstances, and High School Context Characteristics

	b	**SE**
Intercept	−.058	.048
High school academic status		
Math course-taking	.057[*]	.030
Cumulative GPA	.067	.080
Sociodemographic characteristics		
Female	−.803[***]	.059
Wave 1 grade level	−.053	.058
African American [a]	−.677[***]	.159
Latino/a	−.311	.183
Asian American	−1.01[***]	.239
Other race/ethnicity	−.225	.207
Family structure (two-parent)	−.030	.039
Parent education (college graduate)	.036	.039
Wave 1 athletic status	.303[***]	.089
Wave 1 current drinking	.579[***]	.120
Young adult life circumstances		
Dropped out of high school [b]	−.653[**]	.233
Dropped out of 2/4-year college	.181	.133
Currently enrolled in 2-year college	.072	.162
Graduated from 2-year college	−.124	.164
Currently enrolled in 4-year college	.318[*]	.159
Graduated from 4-year college	.571[***]	.169
Married[c]	−1.168[***]	.129
Cohabiting	−.162	.134
Working full time[d]	.138	.095
Working part time	.047	.108
Living with parents	−.239[**]	.090
School context characteristics—predicting intercept		
Mean math course-taking	.050	.087
Mean cumulative GPA	−.022	.276
Mean regular drinking	1.57[*]	.836
Mean risk behavior	.181	.332
Proportion African American	−.720[*]	.318
Proportion Latino/a	.557	.300
Proportion college-educated parents	.009[*]	.005
School context characteristics—predicting math slope		

	b	SE
Mean math course-taking	−.018	.041
Mean cumulative GPA	−.347[**]	.117
Mean regular drinking	−.337	.451
Mean risk behavior	.168	.164
Proportion African American	−.123	.110
Proportion Latino/a	−.026	.115
Proportion college-educated parents	.006[**]	.002

[*]
$p < .05$;

[**]
$p < .01$;

[***]
$p < .001$

Note: N = 5,686 (all models).

[a]White was the reference category for the race/ethnicity dummy variables.

[b]High school graduate was the reference category for the educational dummy variables.

[c]Single was the reference category for the family dummy variables.

[d]Unemployed was the reference category for the work dummy variables.