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Drinking like an adult? Trajectories of alcohol use patterns before and after college graduation

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Abstract

Background—College students who engage in high-risk drinking patterns are thought to "mature out" of these patterns as they transition to adult roles. College graduation is an important milestone demarcating this transition. We examine longitudinal changes in quantity and frequency of alcohol consumption between the college years and the four years after graduation; and explore variation in these changes by gender and race/ethnicity.

Methods—Participants were 1128 college graduates enrolled in a longitudinal prospective study of health-risk behaviors. Standard measures of alcohol consumption were gathered during eight annual personal interviews (76% to 91% annual follow-up). Graduation dates were culled from administrative data and self-report. Spline models, in which separate trajectories were modeled before and after the "knot" of college graduation, were fit to eight annual observations of past-year alcohol use frequency and quantity (typical number of drinks/drinking day).

Results—Frequency increased linearly pre-graduation, slightly decreased post-graduation, and then rebounded to pre-graduation levels. Pre-graduation frequency increased more steeply among individuals who drank more heavily at college entry. Quantity decreased linearly during college, followed by quadratic decreases after graduation.

Conclusions—Results suggest that the post-college "maturing out" phenomenon might be attributable to decreases in alcohol quantity but not frequency. High-frequency drinking patterns that develop during college appear to persist several years post-graduation.

Keywords

Alcohol use trajectories; college graduation; college students; longitudinal research; maturing out

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INTRODUCTION

Excessive drinking among college students is well-recognized as a serious public health problem as it can compromise health, safety, and academic success (National Institute on Alcohol Abuse and Alcoholism, 2002). More than half of full-time college students in the U.S. are current drinkers (59% drank alcohol during the past month), and 39% are characterized as "binge" drinkers, having more than five or four drinks in a row on one occasion during the past month, for males and females, respectively (Substance Abuse and Mental Health Services Administration, 2014). Heavy drinking patterns among college students are often attributed to factors that are common to the college experience, such as establishing peer networks, ease of access to alcohol, living in dormitories away from parents (LaBrie et al., 2007; Vaughan et al., 2009; Weitzman et al., 2003), and involvement in a fraternity or sorority (McCabe et al., 2005; Sher et al., 2001).

Epidemiologic data suggest that heavy drinking, as measured by frequency of binge drinking occasions, peaks in the early 20s, and then declines steadily (Johnston et al., 2014). Several studies have confirmed this pattern using measures of frequency of drunkenness (Brodbeck et al., 2013; Mahalik et al., 2013).

As college students reach adulthood, heavy drinking appears to decrease (Donovan et al., 1983; Gotham et al., 1997; Jackson et al., 2001; Johnston et al., 2014). This change in substance use patterns is sometimes referred to as "maturing out" (Winick, 1962) and coincides with developmental changes in risk-taking behaviors. Some researchers have speculated that young adults no longer need to rely on engaging in risk behaviors such as binge drinking to "feel more adult," because they adopt new adult-like roles, and these behaviors are incompatible with their responsibilities (Bachman et al., 2002; Yamaguchi and Kandel, 1985).

Marriage has been identified as one such developmental milestone that is associated with decreases in heavy drinking (Eitle et al., 2010; Leonard and Rothbard, 1999). Similarly, cohabitation (Duncan et al., 2006) and parenthood (Kerr et al., 2011; Oesterle et al., 2011) are also associated with declines in alcohol use. In recent decades, young adults in the U.S. have begun to delay such traditional milestones as marriage and having children. In 1960, the median age of first marriage was 24 for men and 21 for women; by 2010, on average men and women were getting married four and six years later, respectively (Elliott et al., 2012). From 1970 to 2006, the average age of primiparity increased from 21 to 25 (Mathews and Hamilton, 2009). Delayed acquisition of the traditional developmental milestones of adulthood could potentially impact whether or not young adults "mature out" of heavy drinking patterns. However, college graduation is a developmental milestone that has not been specifically examined for its individual impact on alcohol use trajectories.

Regardless of the declines in heavy drinking observed "on average" among college students once they reach adulthood, many college students experience serious and persistent problems as a result of their drinking, including dependence, injuries, and health problems (National Institute on Alcohol Abuse and Alcoholism, 2002). Heavy drinking during college is strongly predictive of problematic drinking and alcohol-related problems during

adulthood, including in the domains of occupational functioning and educational attainment (Jennison, 2004; O'Neill et al., 2001; Wood et al., 2000). Continued heavy drinking into adulthood is associated with delays in the achievement of developmental milestones, such as marriage and independence from parental financial support (Schulenberg et al., 1996).

The fact that young people drink more heavily but less frequently than adults has been well-documented in the general population (Chen et al., 2004; Windle and Zucker, 2010), however most studies that have examined changes in alcohol use among young adults prospectively have utilized measures that combine quantity and frequency, rather than examining these two dimensions separately. In addition, studies often focus on heavy or binge drinking as opposed to any alcohol use (Donovan and Jessor, 1983; Gotham et al., 1997; O'Neill et al., 2001). Epidemiologic analyses have found that 18 to 24 year olds, on average, consume the greatest number of drinks per occasion of all age groups and that the intensity of binge drinking decreases with age (Kanny et al., 2012). In comparison with quantity, frequency of drinking has been found to have higher sensitivity and specificity for identifying alcohol-related problems among youth (Chung et al., 2012). Similarly, Arria et al. (2014) found that increases in alcohol frequency, not quantity, predicted increased risk for an alcohol use disorder among college students over time.

The purpose of the current study was to compare longitudinal changes in alcohol drinking patterns between the college years and the years following college graduation. Methods for evaluating such longitudinal data have advanced in recent years with the advent of linear mixed models and latent variable growth curve models (Flora, 2008). Based largely in the research of Meredith and Tisak (1990) and Hawkins (1976), a model that has received particular attention in the quantitative literature [e.g., Naumova et al. (2001)] has been termed the 'knot model' or the 'piecewise model'. Such a model typically specifies the occurrence of a critical period or critical event (the knot) and examines the trajectory (rate of change over time) prior to the event (first piece) relative to the trajectory following the event (the second piece). The trajectories themselves can be specified as linear or non-linear slopes, and there is no requirement that the specification be the same in the two pieces, nor, if the slopes are of the same degree of complexity (e.g., both linear), that the rate of change (the slope coefficients) be equal. Indeed, the goal in evaluating a piecewise model is to estimate and test for significance both the complexity in the trajectory pre- and post-change, and if the complexity is the same, to test the equality of the coefficients representing change (Flora, 2008).

The current study employs this piecewise approach to evaluate whether or not college graduation constitutes such a "knot" delineating two distinct time periods characterized by different alcohol use trajectories. It is hypothesized that the pre-graduation rates of change will differ from the post-graduation rates of change. Consistent with the notion of maturing out of heavy drinking patterns, we hypothesize that pre-graduation slopes will be steeper and more positive than the corresponding post-graduation slopes for both quantity and frequency. To extend prior research on demographic differences in alcohol use patterns, subgroup variation in alcohol use trajectories by race/ethnicity and gender are explored. Finally, we test the hypothesis that heavy drinking at the start of college (as measured by

quantity of drinks consumed per drinking day) is associated with steeper increases in frequency of drinking than more modest patterns of drinking at the start of college.

MATERIALS AND METHODS

Design

Data were collected as part of the College Life Study (Arria et al., 2008; Vincent et al., 2012), which followed a cohort of 1,253 young adults for eight years beginning at college entry. After screening the entire incoming freshman class ages 17 to 19 (89% response rate) at one large public university, a sample was selected for longitudinal follow-up by oversampling individuals who had used an illicit drug at least once prior to college and randomly sampling all other students. The two-hour baseline assessment was administered sometime during the first year of college (87% response rate), consisting of a personal interview and self-administered questionnaires measuring a broad range of health-related characteristics and behaviors. Similar follow-up assessments were administered annually, regardless of continued college attendance. Follow-up rates were excellent (n=1142, 91% in Year 2; n=951, 76% in Year 8). Participants were paid for completing each assessment, and interviewers were trained extensively in human subject protections. The study was approved by the university's Institutional Review Board. Informed consent was obtained from all participants, including permission to obtain academic data from the home university's administrative records.

Participants

The present analysis was restricted to the 1132 individuals who graduated from college at some point during the eight-year study interval. Of those, 6% graduated in three years, 66% in four years, 23% in five years, and 5% in six years. The remaining four individuals were excluded because they graduated in less than three years or more than six years, for a final sample size of 1128 (47% male, 73% non-Hispanic white). Individuals with no graduation data were necessarily excluded from all analyses (n=121).

Measures of Alcohol Consumption

Participants were asked annually how many days they had consumed alcohol during the past year, and the number of drinks they had on a typical drinking day (based on standard drink sizes). Individuals who did not consume any alcohol during the past year were automatically coded as 0 for both frequency and quantity. A dichotomous variable of "binge" drinking (defined in males as drinking five or more drinks per typical drinking day, and in females as four or more) was derived from data from the baseline assessment.

Demographic Measures

Gender was coded by interviewers at baseline. Race and ethnicity were assessed as indicators of sample representativeness, and were self-reported by endorsing one or more options (Hispanic, White, Black/African American, American Indian or Alaska Native, Native Hawaiian, Other Pacific Islander, Asian, Other). Race/ethnicity was later dichotomized as non-Hispanic white and minority, due to the preponderance of non-Hispanic whites in this sample (73%). Individuals were automatically coded as minority if

they endorsed none of the options provided, or if they endorsed multiple options or specified their own description.

Analytic Strategy

The statistical approach applies a latent growth curve model, or latent trajectory model, to fit a piecewise model (Flora, 2008). In this case, the critical event was graduation from college, and a structural equation modeling approach was utilized to estimate and test the pre- and post-graduation rates of change using maximum likelihood estimation. Because participants graduated from college in different years during the study, the data were 'centered' on college graduation. That is, the data were arranged backward from the year of graduation, and again forward from the year of graduation. For example, individuals who graduated from college in four years would have four observations prior to graduation and four observations after graduation, while participants who graduated early would have fewer observations prior to graduation and more observations after graduation. The resulting design provided assessment data corresponding to eleven possible time points from six years pre-graduation through five years post-graduation. However, because sample sizes in the two most extreme time points were insufficient to analyze as part of a knot model (i.e., n=57 at six years pre-graduation, n=71 at five years post-graduation), our knot models focus on describing the five years before graduation and four years after graduation.

Missing data were estimated using the full quasi-likelihood estimator (FQL) approach (Muthén et al., 1987) as found in M*plus* (Muthén and Muthén, 2012). Muthén et al. (1987) found the FQL estimator to be superior to the listwise deletion approach (i.e., only use cases with complete data) and the pairwise deletion approach (i.e., only use cases with data on any pair of variables to estimate the association between the two variables in question), even where a missing data mechanism is in operation, and hence the data are not missing completely at random.

Rather than specifying a hypothesized model *a priori*, our exploratory approach involved systematically evaluating models with flat, linear, and quadratic trajectories, for both the overall interval and in the two separate intervals before and after college graduation (see Table 1), so that we could empirically determine which model provided the best fit to the data. Thus, twelve separate models were fit to the data for each of the two alcohol measures (frequency and quantity). The first three models were latent trajectory models with no piecewise specification (i.e., a single trajectory pre- and postgraduation) with polynomials of (1) zero (intercept), (2) one (linear), or (3) two (quadratic) degrees of complexity. The remaining nine models were piecewise models with distinct intercept, linear, and quadratic polynomials specified for the two intervals in the following combinations: intercept-only prior to graduation and (4) intercept-only, (5) linear, or (6) quadratic rates of change following graduation; linear rate of change prior to graduation and (7) intercept-only, (8) linear, or (9) quadratic rates of change following graduation; and quadratic rate of change prior to graduation and (10) intercept-only, (11) linear, or (12) quadratic rates of change following graduation. Models 1–3 were fit to evaluate the possibility that college graduation did not represent a critical event in participants' lives, in which case it would only be necessary to describe a single rate of change in alcohol use in their lives during the eight-

year period under observation, whereas the piecewise models (i.e., models 4–12) all allowed for differences between the pre- and post-graduation trajectories. Finally, the best-fitting models on frequency and quantity were then re-fit within the four subgroups based on sex and race/ethnicity. Similarly, to examine the interrelationship between alcohol quantity and frequency, a third subgroup analysis was performed on the best-fitting frequency model within the two baseline alcohol quantity groups (binge, non-binge).

Relative model fit was determined by use of the multiple criteria that are applied to structural equation models: χ^2 tests of model fit, χ^2 difference tests comparing competing models, the Bentler (1990) comparative fit index (CFI), and the root mean square error of approximation [RMSEA (Steiger, 1990)]. The goal in comparing the various models would be to find the most parsimonious model with CFI .95 and RMSEA .05 [although such a solution is not always possible (Bollen and Curran, 2006; Hu and Bentler, 1999)]. In those cases in which a final model had polynomials with the same degree of complexity (e.g., both linear) at pre-and post-graduation periods, the pre- and post-graduation slopes were constrained to be equal in order to determine whether the rate of change was equal prior to and following college graduation.

RESULTS

Trajectories of Alcohol Use Frequency

For the analysis of alcohol frequency among the overall sample, the best-fitting model accounted for a linear rate of change before graduation and both linear and quadratic change after graduation (see Table 1). Two alternative models exhibiting slightly superior fit statistics were rejected because the post-graduation linear and quadratic terms did not maintain statistical significance (*p*s>.05). As shown in Figure 1, Panel A, the best-fitting model estimated a pre-graduation trajectory with a significant positive slope (*b*=14.49, *SE*=0.64, *p*<.001), and a post-graduation trajectory exhibiting a slight but significant decline followed by a rebound (quadratic, *b*=0.83, *SE*=0.37, *p*=.024), with an overall linear decline (*b*=−4.61, *SE*=1.56, *p*=.003) by the end of the post-graduation interval.

When the alcohol frequency data were analyzed within the four demographic subgroups, convergence problems were encountered with the model that provided the best fit in the overall sample (see above), due to insufficient complexity in the post-graduation data. Further examination of the results indicated that white females were the only subgroup with a significant post-graduation slope, and model fit improved slightly by constraining the post-graduation slopes to zero for the other three subgroups (i.e., white men, minority men, and minority women). Further testing revealed that the pre-graduation slopes were not significantly different between the four subgroups, and therefore we constrained the pre-graduation slopes to be equal. Ultimately, as shown in Figure 1, Panel B, the final best-fitting version of the model (χ^2=456.6, *df*=146, *CFI*=.93, *RMSEA*=.087) accounted for parallel trajectories of linear increase prior to graduation (*b*=13.28, *SE*=0.60, *p*<.001), a post-graduation linear decrease among white women only (*b*=−2.34, *SE*=0.83, *p*=.005), and stable post-graduation trajectories for all others. These results suggest that the slight decline and rebound seen in the overall model were largely attributable to changes among white women.

For the analysis of alcohol frequency within the two baseline quantity groups (binge, non-binge), the best-fitting model (χ^2=425.6, *df*=72, *CFI*=.89, *RMSEA*=.10) accounted for substantially different trajectories for the two subgroups (see Figure 1, Panel C). For the binge group, alcohol frequency increased throughout the pre-graduation period (linear, *b*=29.56, *SE*=3.22, *p*<.001), albeit less rapidly as graduation approached (quadratic, *b*=−3.03, *SE*=0.66, *p*<.001), whereas the trajectory in the non-binge group exhibited a simple linear increase (*b*=14.89, *SE*=0.82, *p*<.001). After graduation, drinking frequency in the binge group declined and then rebounded slightly (quadratic, *b*=1.56, *SE*=0.48, *p*=.001) for an overall linear decrease (*b*=−8.49, *SE*=2.02, *p*<.001), whereas in the non-binge group the postgraduation slope was constrained to zero.

Trajectories of Alcohol Quantity

Unlike the models on alcohol frequency, the analysis of alcohol quantity revealed significant decreasing trends both before and after college graduation. The model accounting for linear changes before graduation and quadratic changes after graduation provided the best fit to the data (χ^2=80.1, *df*=30, *CFI*=.99, *RMSEA*=.04; see Table 1). A more complex model with comparably good fit was rejected because the pre-graduation linear and quadratic terms were not significant (*p*s>.05). Alcohol quantity declined slowly before graduation (*b*=−.17, *SE*=.04, *p*<.001; see Figure 2, Panel A). After graduation, alcohol quantity declined more rapidly at first and then levelled off (quadratic *b*=.09, *SE*=.01, *p*<.001), with an overall linear decline that was statistically significant (*b*=−.71, *SE*=.06, *p*<.001).

When the alcohol quantity data were analyzed within the four demographic subgroups, the model accounting for linear change before and after graduation provided the best fit (χ^2=528.8, *df*=144, *CFI*=.92, *RMSEA*=.10), whereas the addition of a quadratic term in the post-graduation trajectory created convergence problems. Three of the four subgroups (i.e., white males, white females, and minority females) exhibited significant declines in alcohol quantity during college, all with similar slopes ranging from −.16 to −.10 (see Figure 2, Panel B). After graduation, the rates of decline became faster for white men (−.51) and white women (−.36), whereas for minority women the pre- and post-graduation rates of decline were remarkably similar (−.10 and −.09). Minority men exhibited no significant change in alcohol quantity during college (*p*=.443) followed by a significant post-graduation decline (*b*=−.31, *SE*=.07, *p*<.001).

DISCUSSION

In this sample of young adults who graduated from college, alcohol drinking became increasingly frequent throughout college, on average, and leveled off thereafter at pre-graduation levels. By contrast, alcohol quantity (i.e., number of drinks consumed per drinking day) decreased steadily both during and after college. Findings extend prior research on the phenomenon of maturing out of heavy drinking patterns (Donovan and Jessor, 1983; Kerr et al., 2011; Labouvie, 1996) by focusing on college graduation as a turning point. Results support our hypothesis that graduation would be a critical event, in that the pre-and post-graduation rates of change in alcohol frequency and quantity were significantly different. Interestingly, both dimensions exhibited quadratic changes after

college, whereby the post-college trajectory deviated from the pre-college trajectory in a way that was more pronounced immediately after graduation, followed by a levelling-off trend.

This study makes an important contribution to the small body of literature examining frequency and quantity as distinct dimensions of drinking (Arria et al., 2014; Chung et al., 2012). While the observed decline in alcohol quantity during and after college comports with prior evidence of a maturing-out phenomenon, to our knowledge this is the first longitudinal study to document an opposite simultaneous trend in alcohol frequency. Together, results support the notion that, on average, the high-quantity, low-frequency drinking patterns that characterize the early college years are gradually replaced by higher-frequency, lower-quantity patterns, which mirror earlier cross-sectional findings comparing youth and adults in the general population (Windle and Zucker, 2010). Moreover, such changes appear to be highly consistent regardless of race/ethnicity and gender, with two notable exceptions—namely, minority men maintained stable alcohol quantities during college (compared with declines in all other groups), and white women decreased their alcohol frequency after graduation (compared with stable frequency in all other groups).

This study makes a unique contribution with respect to the statistical approach used to evaluate a critical event. With the exception of a study evaluating changes in body fat accretion following menarche (Naumova et al., 2001), the use of “knot models” has seen only limited use in epidemiologic research. Other developmental milestones such as the acquisition of full-time employment and family formation in relation to longitudinal changes in young adults’ drinking patterns could be investigated using a similar statistical approach.

The current study has limited generalizability to students attending other types of universities or who take more than six years to graduate from college. Because alcohol consumption was measured annually regardless of college attendance and/or graduation, we could not completely eliminate the possibility of overlap between pre- and post-graduation drinking patterns during the year in which graduation occurred. Because the first post-graduation assessment, by definition, assessed a mixture of behaviors that occurred both before and after graduation, our design reflects a conservative approach aimed at minimizing the possibility of contaminating pre-graduation data with post-graduation behaviors. Although our sampling design was advantageous in oversampling the number of high-risk individuals (i.e., used an illicit drug or nonmedically used a prescription drug at least once during high school), we cannot say how our sampling design might have affected the observed trajectories for the overall sample; however, our subgroup analysis of binge and non-binge drinkers, in part, evaluated any such effects. Finally, because model fit was suboptimal in our three subgroup analyses (RMSEA>.08), we cannot rule out the possibility that a more complex model might have given rise to the data.

Findings highlight several areas for future research. Although we examined certain subgroup variations in drinking pattern trajectories with respect to demographics and binge drinking, we did not account for other potentially important influences on drinking patterns, such as graduate school enrollment. Moreover, because our focus was on the importance of college graduation, we cannot say how such trajectories might differ for students who left college

without completing their degree; however, previous findings from this sample suggest that such premature departures tend to be preceded by heavier drinking and drug use, on average (Arria et al., 2013a; Arria et al., 2013b). We also cannot rule out the possibility that the observed findings might be partially attributable to the effects of attaining legal drinking age, given that graduation and the 21st birthday occurred during the same year for 58% of our sample. Whereas our sample was restricted to traditional-age college students (i.e., ages 17 to 19 at college entry), in light of the growing diversity of pathways that students take through college, future studies should explore the relative importance of the transition to post-college life in more heterogeneous samples that encompass both traditional and non-traditional students. The 21st birthday should also be examined as a possible turning point in the drinking patterns of non-college-attending individuals.

In this study, binge drinking at college entry was associated with both higher-frequency drinking at baseline and a faster rate of increase in alcohol frequency throughout college. In fact, rather than regressing toward the mean, students who were binge drinkers at college entry continued drinking more often than their peers both during and after college. These findings highlight the importance of identifying and intervening with students who already have established high-risk drinking patterns by college entry (Bersamin et al., 2007; Doumas and Andersen, 2009).

In this sample, lower-quantity, high-frequency drinking patterns were sustained for several years after college graduation. Messages about the acute risks of heavy episodic drinking such as personal injury and respiratory depression might be most salient in younger college students when such patterns are often common. By contrast, recent college graduates who drink frequently, but at lower quantities, might perceive that they have “grown out” of risky drinking practices and regard their current drinking pattern as being responsible and “adult” and, accordingly, less risky. Yet even at moderate quantities, high-frequency drinking patterns still confer significant risk for drunk driving (Gruenewald et al., 1996) and the development of alcohol dependence (Arria et al., 2014). Moreover, in this sample, average alcohol consumption continued to exceed current standards for moderate consumption (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010), even four years after college graduation. Recent meta-analyses support a clear dose-response relationship between alcohol consumption and risk for numerous health problems, including cancers, liver cirrhosis, hypertension, chronic pancreatitis, and injuries (Corrao et al., 2004; Taylor et al., 2009). With certain cardiovascular diseases (e.g., total stroke, coronary artery disease), a non-linear relationship is evident, such that risk increases only at heavier levels of consumption, whereas modest consumption might be protective (Corrao et al., 2004; Zhang et al., 2014). Given that prior studies have relied primarily on measures of alcohol quantity, and given the present finding that quantity and frequency change differentially over time, the possibility that drinking frequency might exert a distinct influence on health outcomes remains an open question (Skov-Ettrup et al., 2011) and should be a focus of future research, in order to inform guidelines about limits on the frequency of drinking.

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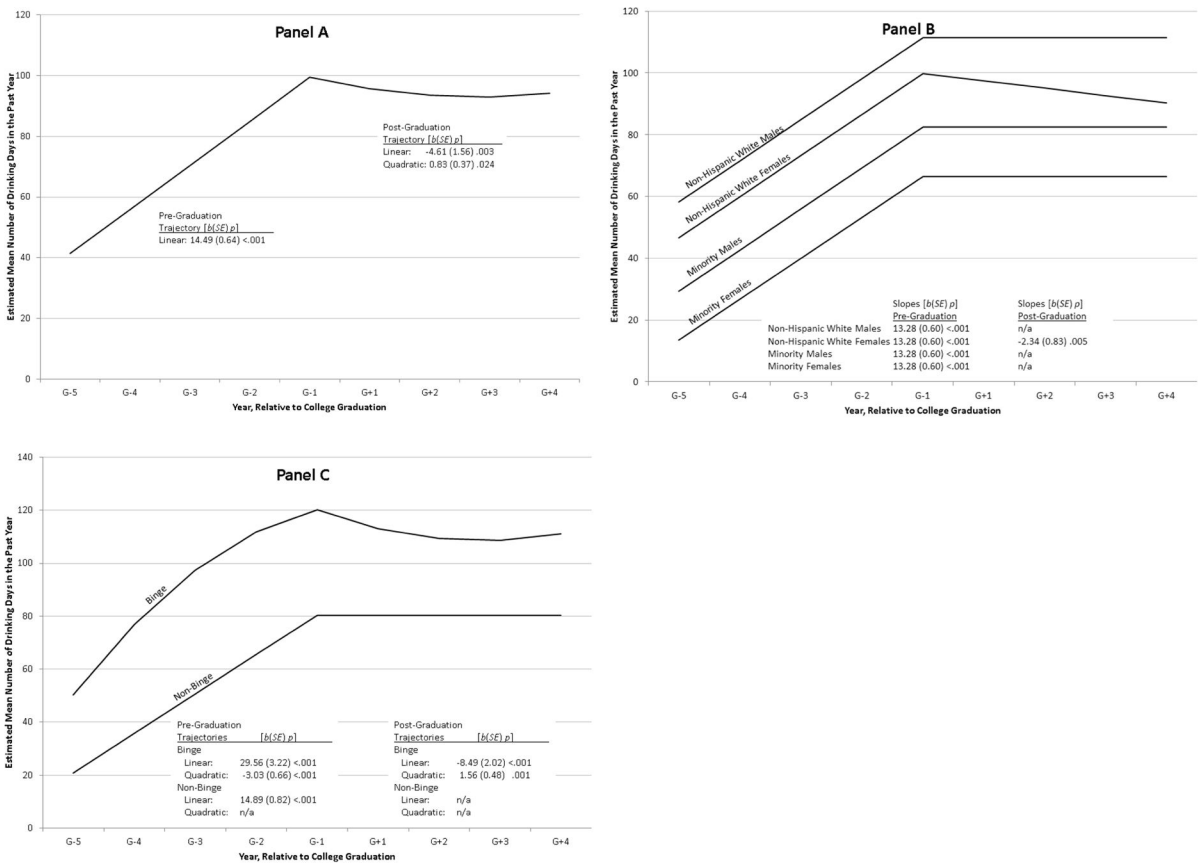

Fig. 1.

Trajectories of alcohol use frequency before and after college graduation (A) among the overall sample, (B) by race/ethnicity and gender, and (C) by baseline drinking pattern. *Note*. Baseline drinking pattern defined as binge (four or more drinks/day for females and five or more drinks/day for males) and non-binge (drank less than binge level) during the first year of college. Students who did not drink during the past year during the first year of college were excluded from this model because of convergence problems caused by small sample size and insufficient variability in the alcohol frequency measure.

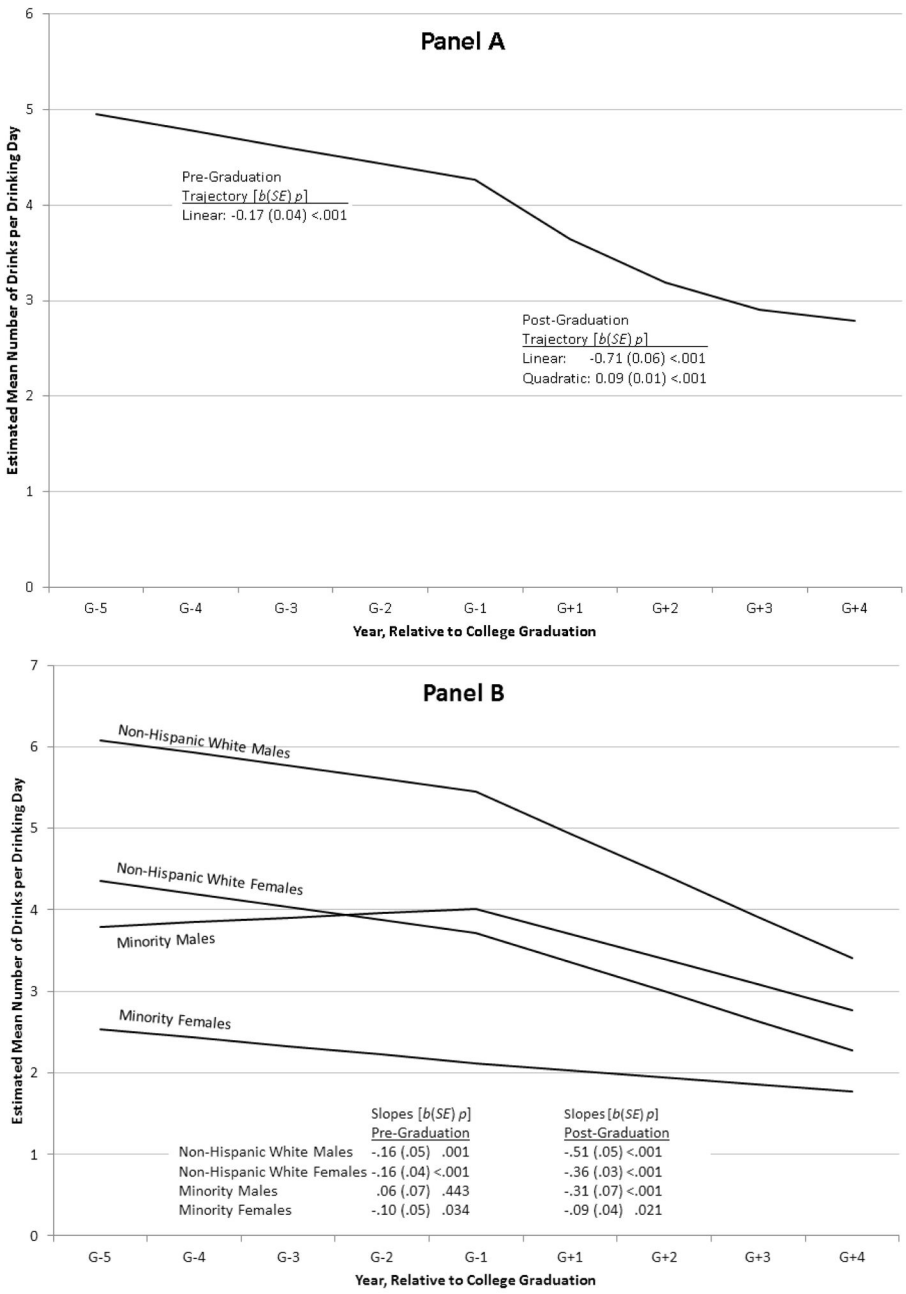

Fig. 2.

Trajectories of alcohol quantity before and after college graduation (A) among the overall sample and (B) by race/ethnicity and gender.

Table 1

Summary of Model Fit Statistics for Alcohol Use Frequency and Quantity

Frequency Models	χ^2	*df*	**CFI**	**RMSEA**
Growth Curve Models				
Intercept only	2016.0	42	.55	.20
Intercept and Linear	930.0	39	.80	.14
Intercept Linear and Quadratic	319.5	35	.94	.09
Knot Models				
Intercept : Intercept	1288.2	39	.72	.17
Intercept : Intercept Linear	1356.1	39	.70	.17
Intercept : Intercept Linear Quadratic	1195.5	35	.74	.17
Intercept Linear : Intercept	704.7	39	.86	.12
Intercept Linear : Intercept Linear	258.0	35	.95	.08
Intercept Linear : Intercept Linear Quadratic[a]	**174.0**	**30**	**.97**	**.07**
Intercept Linear Quadratic : Intercept	501.7	35	.89	.11
Intercept Linear Quadratic : Intercept Linear	134.9	30	.98	.06
Intercept Linear Quadratic : Intercept Linear Quadratic	71.2	24	.99	.04

Quantity Models	χ^2	*df*	**CFI**	**RMSEA**
Growth Curve Models				
Intercept only	1379.3	42	.68	.17
Intercept and Linear	299.0	39	.94	.08
Intercept Linear and Quadratic	219.6	35	.96	.07
Knot Models				
Intercept : Intercept	1379.3	42	.68	.17
Intercept : Intercept Linear	303.5	39	.94	.08
Intercept : Intercept Linear Quadratic	127.8	35	.98	.05
Intercept Linear : Intercept	1001.6	39	.77	.15
Intercept Linear : Intercept Linear	224.0	35	.96	.07
Intercept Linear : Intercept Linear Quadratic[a]	**80.1**	**30**	**.99**	**.04**
Intercept Linear Quadratic : Intercept	917.4	35	.79	.15
Intercept Linear Quadratic : Intercept Linear	203.8	30	.96	.07
Intercept Linear Quadratic : Intercept Linear Quadratic	67.2	24	.99	.04

Note. Models are denoted as “effect : effect” where the first effect indicates the trajectory of change prior to graduation, and the second effect indicates the trajectory of change after graduation. $p<.001$ for all models.

[a]Denotes model selected as having the best fit to the data.