



Published in final edited form as:

*J Adolesc Health*. 2013 September ; 53(3): 356–362. doi:10.1016/j.jadohealth.2013.04.003.

## Longitudinal relationships between college education and patterns of heavy drinking: A comparison between Caucasians and African Americans

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### Abstract

**Purpose**—The current study compared longitudinal relationships between college education and patterns of heavy drinking from early adolescence to adulthood for Caucasians and African Americans.

**Methods**—Data were collected from N=9,988 non-Hispanic Caucasian and African American participants from all four waves of the National Longitudinal Study of Adolescent Health. Growth curve modeling tested differences in rates of change and levels of heavy drinking from ages 13–31 among non-college youth, college withdrawers, 2-year-college graduates, and 4-year-college graduates, and compared these differences for Caucasians and African Americans.

**Results**—There were significant racial differences in relationships between college education with both changes in and levels of heavy drinking. Rates of change of heavy drinking differed significantly across the college education groups examined for Caucasians but not for African Americans. In addition, Caucasians who graduated from 4-year colleges showed the highest levels of heavy drinking after age 20, although differences between the four groups diminished by the early 30s. In contrast, for African Americans, graduates from 2- or 4-year colleges did not show higher levels of heavy drinking from ages 20–31 than the non-college group. Instead, African American participants who withdrew from college without an associate's, bachelor's, or professional degree consistently exhibited the highest levels of heavy drinking from ages 26–31.

**Conclusions**—The relationship between college education and increased levels of heavy drinking in young adulthood is significant for Caucasians but not African Americans. Conversely, African Americans are likely to be more adversely affected than Caucasians by college withdrawal.

### Keywords

college education; alcohol use; heavy drinking; racial differences

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## Introduction

Heavy alcohol use among college-age populations, defined as drinking an excessive amount of alcohol at one sitting and/or drinking to the point of intoxication, remains a serious public health concern. In addition to the immediate risks of heavy drinking (e.g., alcohol poisoning), heavy drinking in adolescence and young adulthood has been associated with broader long-term health consequences, such as increased risks of alcohol dependence, risky sexual behaviors, and mental health problems<sup>1</sup>. According to the most recent National Survey on Drug Use and Health (2009)<sup>2</sup>, rates of binge drinking are higher among 21–25 year olds than among either teenagers or adults aged 26 and older. Likewise, longitudinal research indicates that heavy drinking increases during adolescence and peaks during the mid-20s<sup>3–6</sup>, suggesting that the transition from high school to college or non-college settings is a critical period for development of alcohol misuse.

Cross-sectional research has documented higher levels of heavy drinking among college students compared to non-college youth<sup>7–12</sup>. For example, data from Monitoring the Future<sup>10–12</sup> indicate that although college-bound high school students report lower rates of heavy drinking than their non-college-bound peers, they are more likely to exhibit higher levels of heavy drinking during college years. However, previous work in this area has focused largely on mean-level comparisons between currently-enrolled college students and their non-college counterparts without looking at longitudinal relationships between college education and patterns of heavy drinking.

Only two studies have used nationally representative samples to examine relationships between college education and heavy drinking longitudinally. Based on a subsample of N=7,083 participants aged 13–24 during the first three waves of the National Longitudinal Study of Adolescent Health (Add Health), youth enrolled in 2- or 4-year colleges reported higher levels of binge drinking and different rates of change in binge drinking than non-college youth from the late teens to early 20s<sup>13</sup>. In contrast, the second study, based on N=7,859 participants from the National Longitudinal Survey of Youth (NLSY), found relatively *lower* levels of heavy drinking from ages 18–37 among individuals with at least some college education than individuals who did not go to college, with the differences being particularly pronounced between mid-20s and early 30s<sup>3</sup>. This latter finding suggests that the adverse effects of college attendance on heavy drinking during late adolescence and young adulthood commonly found in research using college-aged samples may attenuate, or even reverse, after the mid-20s. This hypothesis is consistent with cross-sectional data collected at age 35 from Monitoring the Future, which showed that levels of substance use, including heavy drinking, were actually lowest among adults with a college degree compared to both college withdrawers and individuals who did not attend college<sup>14</sup>. The longitudinal study based on Add Health, which only measured participants' drinking through age 24, could not assess the long-term impact of college education on heavy drinking in later adulthood. At the same time, the study based on NLSY did not measure drinking behaviors prior to age 18. Thus, it is possible that the observed group differences were present prior to the college years, which may have biased the interpretation of their results. Longitudinal studies beginning in early adolescence and continuing beyond the college years are needed in order to evaluate the *long-term effects* of college attendance on heavy drinking throughout adulthood, while considering any pre-existing differences among groups.

Additionally, neither of the two studies examining longitudinal relationships between college education and heavy drinking have considered racial/ethnic differences in these associations. There is evidence that motivations for drinking may differ across race/ethnicity. For example, African Americans are more likely to engage in heavy alcohol use in

stressful situations, such as unemployment or low educational attainment<sup>15–18</sup>, whereas Caucasians are more likely to be influenced by peer alcohol use and to drink heavily during celebratory events or holidays<sup>19,20</sup>. Given that drinking behaviors among Caucasians may be more strongly influenced by social context, the college setting, where alcohol is readily available and alcohol use is perceived as normative<sup>18</sup>, may be more conducive to excessive alcohol use for Caucasians than for African Americans. Several cross-sectional studies have found that Caucasian college students report higher levels of heavy drinking than their non-college-educated counterparts, but college attendance is inversely related to or not associated with heavy drinking among African American youth<sup>17,20,21</sup>. However, as these studies were cross-sectional, it is unclear whether the observed racial/ethnic differences were present prior to young adulthood and/or whether differences persisted beyond the college years.

Using a nationally representative sample, the current study compares longitudinal relationships between college education and patterns of heavy drinking from early adolescence to adulthood for Caucasians and African Americans. Gender is included as a control variable given observed differences in levels of and changes in alcohol use and heavy drinking across males and females<sup>5,6,22</sup>. Parental education is also included as a covariate given its association with both alcohol use<sup>23,24</sup> and academic attainment<sup>25–27</sup>. We compare patterns of heavy drinking among four different groups: non-college youth, college-withdrawers, 2-year-college graduates, and 4-year college graduates, given prior evidence supporting differences in heavy drinking between these groups<sup>13,21</sup>. Based on findings from previous cross-sectional research, we hypothesize that college education will be more strongly associated with both changes in and levels of heavy drinking for Caucasians than for African Americans. We did not develop hypotheses about the specific differences across the four college education groups in trajectories of heavy drinking, as there is a lack of theoretical and empirical work considering these between-group differences separately for Caucasians and African Americans.

## Methods

### Sample

Data are from Waves I (1994–1995) through IV (2007–2008) of the National Longitudinal Study of Adolescent Health (Add Health)<sup>28</sup>. Add Health is a population-based, nationally representative sample of adolescents followed longitudinally. Add Health includes youth aged 11–21, 12–22, 18–28, and 24–34 at Waves I, II, III, and IV, respectively. Current analyses focus on comparisons between the two largest groups: non-Hispanic Caucasians (N=10,825) and non-Hispanic African Americans (N=4,603).

The present sample is restricted to participants with data on heavy drinking in at least one of the four waves and who reported college education status in Wave IV (N=11,959). Missing data was processed with listwise deletion, resulting in a sample of N=11,383 participants. In addition, we excluded participants whose reports of educational status were inconsistent (N=123) and participants who were attending school at Wave IV but had not yet achieved any type of degree, as their college completion status remained unknown (N=1,272). Wave I data for 305 participants younger than age 13 and Wave IV data for 179 participants older than age 31 were also excluded because sample sizes at these ages were too small to be representative of each racial and college status group. The final sample size for the current study is N=9,988.

## Measures

**Age**—Participants' ages were calculated by subtracting their birth date from the interview date at each of the four waves of data collection.

**Gender**—Gender was coded as 1=male and 0=female. The sample consists of N=4,731 males (47.4%) and N=5,257 females (52.6%).

**Parental Education**—Adolescents reported the highest level of education achieved by their residential mother and residential father during Wave I. Responses ranged from 0=never went to school to 9=professional training beyond a four-year college or university. Parental education was averaged across both mothers and fathers for youth who lived with two parents.

**Race**—Self-reported race obtained in Wave I was coded as 0=non-Hispanic Caucasian (N=7,329; 73.4%) and 1=non-Hispanic African American (N=2,659; 26.6%).

**College Education Status**—At Wave IV, participants were asked to indicate the highest grade or year of regular school they had completed (1=8<sup>th</sup> grade or less to 13=completed post-baccalaureate or professional education) and the most recent degree they had received (1=have not received a degree or certificate to 8=professional doctorate). Based on their responses, participants were classified into four groups: 1) a non-college group (i.e., participants who did not report any college education; 33.2%); 2) a college-withdrawer group (i.e., participants who completed some college education but did not achieve an associate's, bachelor's, or professional degree; 22.7%); 3) a 2-year-college group (i.e., participants whose highest degree was an associate's degree; 7.6%); and 4) a 4-year-college group (i.e., participants who achieved at least a bachelor's degree; 36.5%).

**Heavy Drinking**—Two items at each wave assessed heavy drinking in the past year: a) how many days participants drank 5 drinks in a row; and b) how many days participants had gotten drunk or very high on alcohol. Responses for both items ranged from 0=never to 6=everyday or almost everyday. Items were strongly correlated ( $r=.82$ ,  $p<.001$ ) and were averaged to create a heavy drinking score. The heavy drinking score was positively skewed (skewness=1.45) and was log transformed for analyses.

## Analytic Plan

Growth curve modeling was used to examine trajectories of heavy drinking across age<sup>29</sup>. Four models were fitted using multi-level hierarchical regression analyses in SPSS: an unconditional means model estimating the within-individual and between-individual variance of heavy drinking (Model 1), an unconditional growth model testing both the linear (age) and quadratic (age<sup>2</sup>) change in heavy drinking (Model 2), a conditional model examining relationships between control variables, race, and college education with initial levels and rates of change of heavy drinking (Model 3), and an interaction model testing racial differences in relationships between college education with initial levels and rates of change of heavy drinking (Model 4). For initial analyses, age was centered at 13 to explore relationships between college education and initial levels of heavy drinking (i.e., model intercept), and dummy variables for college education were created using non-college participants as the reference group. Analyses were re-run with age centered at each age point from ages 14–31 to test for differences in levels of heavy drinking across the entire age range. Similarly, to thoroughly test relationships between college education and heavy drinking, differences in rates of change and levels of heavy drinking among the three college attendant groups were further tested in separate follow-up analyses using the college-withdrawer and the 2-year-college group as the comparison group. Missing data in heavy

drinking were handled utilizing Maximum Likelihood. The fit of each model was calculated using a  $-2 \log$ -likelihood ( $-2LL$ ). Comparisons across models were based on the differences in  $-2LL$  between models ( $\Delta$ - $2LL$ ).

## Results

Analysis was conducted to compare African American and Caucasian participants included in ( $N=9,988$ ) and excluded from ( $N=5,440$ ) the final sample. Exclusion rates were higher among African Americans (42.2%) than Caucasians (32.3%;  $\chi^2_1=139.73$ ,  $p<.001$ ). Differences were also found in gender ( $\chi^2_1=26.63$ ,  $p<.001$ ), age ( $F[1,15403]=26.04$ ,  $p<.001$ ), and parental education ( $F[1,14557]=9.75$ ,  $p<.01$ ). Males (37.3%) were slightly more likely to be excluded than females (33.3%). Excluded participants were older ( $M_{\text{excluded}}=16.16$ ,  $SD=1.78$ ;  $M_{\text{included}}=16.01$ ,  $SD=1.70$ ) and reported lower levels of parental education ( $M_{\text{excluded}}=5.56$ ,  $SD=2.10$ ;  $M_{\text{included}}=5.67$ ,  $SD=2.10$ ) at Wave I, although these latter differences were quite small (Cohen's  $d<0.10$ ). No significant differences were found in Wave I levels of heavy drinking between included and excluded youth. We were unable to compare college education or rates of heavy drinking at Waves II-IV, as most of the excluded participants had missing data on these measures.

Table 1 shows demographic characteristics of participants in each college education group. African Americans were more likely to be in the non-college and college-withdrawer groups, and were less likely to have completed 2-year or 4-year degrees than Caucasians ( $\chi^2_3=53.76$ ,  $p<.001$ ), although differences were relatively modest (i.e., 5%). Males were over-represented in the non-college group, and females over-represented in the 4-year-college group ( $\chi^2_3=164.98$ ,  $p<.001$ ). Parental education was lowest among the non-college group and highest among the 4-year-college group, with the two other groups falling in-between ( $F[3, 9984]=865.39$ ,  $p<.001$ ).

Results from the hierarchical growth curve models are shown in Table 2. Based on the intraclass correlations, 29.7% of the variance of heavy drinking existed between individuals, while the remaining variance (70.3%) was due to within-person factors, including age. The unconditional growth curve model (Model 2) had a significantly better fit than the baseline model (Model 1). Fixed effects for the linear and quadratic function of age were both significant. Specifically, levels of heavy drinking increased from age 13, reached a stationary point (i.e., the highest level) between ages 24–25, and then declined thereafter. Results from Model 3 revealed that males exhibited significantly lower initial levels of heavy drinking, but had significantly faster rates of linear and quadratic change than females. Greater parental education was associated with lower initial levels and higher rates of linear and quadratic change of heavy drinking. Initial levels of heavy drinking did not differ significantly between African Americans and Caucasians; however, African Americans reported slower rates of linear and quadratic change. Results from Model 3 also indicated significant relationships between college education status with both initial levels and rates of change of heavy drinking. However, findings from Model 4, which had a significantly better fit than Model 3, suggested racial differences in these relationships. Therefore, patterns of heavy drinking of the four college education groups are shown separately by race in Figure 1.

College education was significantly associated with *rates of change* of heavy drinking for Caucasians but not for African Americans. All of the differences in rates of change of heavy drinking among college education groups were significant for Caucasians, except for comparisons between the college-withdrawer and the 2-year-college groups. Among Caucasians, non-college participants showed the slowest rate of increase from age 13 to mid-20s and the slowest rate of decline from mid-20s to age 31, whereas heavy drinking

both increased at the fastest rate from age 13 to mid-20s and declined most rapidly thereafter among the 4-year-college group. Rates of change of heavy drinking for college-withdrawers and 2-year-college graduates fell in-between those of the other two groups. In contrast to the patterns observed among Caucasians, none of the between-group comparisons in rates of change of heavy drinking were significant for African Americans.

Analyses centering age at each age point from ages 13–31 revealed racial differences in relationships between college education and *levels* of heavy drinking. For Caucasians, significant between-group differences in levels of heavy drinking were evidenced across virtually the entire developmental period. The non-college and the 4-year-college groups generally exhibited the highest and the lowest levels of heavy drinking from ages 13–18, respectively, with the other two groups falling in-between, whereas an inverse pattern was observed from ages 20–29. Only the differences between the non-college and the 4-year-college groups remained significant at age 30. No significant between-group differences were found at age 31. Among African Americans, non-college youth exhibited the highest levels of heavy drinking from ages 13–19. Although this is similar to patterns observed in Caucasians, differences were not as marked and only the comparisons between the 4-year-college group with the non-college and college-withdrawer groups were significant. From ages 20–25, there were no significant between-group differences in levels of heavy drinking. Finally, African American college withdrawers consistently exhibited significantly higher levels of heavy drinking than their non-college and 4-year-college counterparts after age 25, and these differences persisted through ages 30–31.

## Discussion

The present study compared longitudinal relationships between college education and patterns of heavy drinking for Caucasians and African Americans drawn from a nationally-representative population. Our study extends previous research in this sample by examining the long-term associations between college education and patterns of heavy drinking during the late 20s and early 30s. In addition, this is the first study to examine and demonstrate racial differences in longitudinal relationships between college education and patterns of heavy drinking.

Similar to patterns reported in cross-sectional studies examining racial differences in relationships between college education and heavy drinking<sup>17,20,21</sup>, we found that college education was more strongly associated with patterns of heavy drinking for Caucasians compared to African Americans. Among Caucasians, differences between college education groups in both changes in and levels of heavy drinking were significant. In comparison to the non-college group, heavy drinking increased more rapidly for college attendants from early adolescence to mid-20s, especially for 4-year-college graduates. Furthermore, levels of heavy drinking for 4-year-college graduates surpassed those of their non-college age-mates from ages 20–25. These patterns observed among Caucasians are generally consistent with findings from prior cross-sectional studies of college-aged samples, which suggest a positive association between college attendance and heavy alcohol use<sup>9,11,12,30–34</sup>. However, our longitudinal study explicitly demonstrates that differences in levels of heavy drinking between college attendants and non-college youth diminish during the late 20s and disappear entirely by ages 30–31 for Caucasians. Consistent with the hypothesis that social context plays an important role in the etiology of drinking behaviors among Caucasians<sup>19,20</sup>, one explanation for this age trend is that Caucasian college attendants may desist from heavy drinking during post-college adulthood as a result of their transition to social settings (e.g., full-time employment, establishing a family) that discourage excessive alcohol use<sup>14</sup>. An alternative but related explanation is that protective factors associated with graduating from college, such as higher income and more stable employment<sup>35</sup>, may account for the faster

decrease in levels of heavy drinking among college graduates after the college years<sup>36,37</sup>. Future research could determine whether life transition events and/or protective factors explain the marked decrease in heavy drinking during the late 20s and early 30s observed among Caucasian college attendants.

Although the patterns observed among Caucasians are largely consistent with prior research, a novel finding from the present study is the different patterns of longitudinal relationships between college education and heavy drinking among African Americans. Most notably, in contrast to Caucasians, college education was not related to patterns of change in heavy drinking over time for African Americans. Moreover, no differences in levels of heavy drinking were found between any of the four groups from ages 20–25. Our results therefore indicate that among African Americans, going to college does not confer the same risk of increasing rates of drinking behaviors, even in the short term, observed in Caucasians. The lack of differences between college and non-college African Americans from ages 20–25 reinforces the hypothesis that social factors play a less important role in shaping drinking behaviors among minority individuals<sup>19,20</sup>.

We also found racial differences in relationships between college withdrawal and levels of heavy drinking in adulthood. Among Caucasians, levels of heavy drinking were elevated among college withdrawers compared with non-college participants from ages 20–29, but were still lower than the 4-year-college group. Differences between college withdrawers and the other groups among Caucasians also disappeared entirely by ages 30–31. In contrast, among African Americans, higher levels of heavy drinking observed among college-withdrawers did not become significant until age 26, and the elevated levels of heavy drinking among college withdrawers persisted through the early 30s, suggesting a delayed and potentially longer-lasting impact of college withdrawal among African Americans. Levels of heavy drinking among college withdrawers were further higher compared to both non-college participants and participants with 4-year-college degrees among African Americans, suggesting that this subgroup is at greatest risk for the development of problematic alcohol use. We note, however, that the present study cannot determine the causality of college education completion status and drinking behaviors. Heavy drinking may have resulted in poor school performance, which may in turn have led to college withdrawal<sup>38</sup>. Studies obtaining repeated measures of heavy drinking and academic performance, especially among African American college students, can further clarify causal relationships between these processes.

## Limitations

Our results should be interpreted in the context of several limitations. First, our measures of heavy drinking are imperfect. Frequencies of heavy drinking over the past 12 months were assessed using a Likert-based frequency scale, rather than actual number of days. This approach may give unnecessary weights to extreme drinking episodes and/or more recent drinking episodes. In addition, we did not use gender-specific cut-off points to characterize heavy drinking. Although we acknowledge these limitations, similar measures of heavy drinking have been used in previous longitudinal studies examining relationships between college education and patterns of heavy drinking<sup>3,13</sup> and in cross-sectional studies examining racial differences in these relationships<sup>17,20,21</sup>. Thus, the use of these measures in the current study enables a more direct comparison with prior research. Moreover, gender differences in both rates of change and levels of heavy drinking were adjusted in our analyses, so that gender differences in cut-offs of heavy drinking are unlikely to have biased the study's primary results. Relatedly, as the current study is focused on patterns of heavy drinking, our results may not generalize to other measures of alcohol use, such as typical quantity or frequency. A third limitation is that attrition rates were higher among males and African Americans, and we were unable to compare educational levels or rates of heavy

drinking at Waves II–IV between included and excluded participants. Therefore, results of the present study need replication in other samples before any firm conclusions could be drawn. Finally, future studies are needed to explicitly test if a wide range of known correlates of drinking behaviors (e.g., drinking motivations, life stress, sensation seeking, religiosity, alcohol expectancies)<sup>39</sup> account for racial differences in relationships between college education and heavy drinking reported in the present study. Despite these limitations, findings from the present study are informative as they are the first to demonstrate racial differences in the longitudinal relationships between college education and patterns of heavy drinking.

## Acknowledgments

This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (<http://www.cpc.unc.edu/addhealth>). No direct support was received from grant P01-HD31921 for this analysis. Drs. Chen and Jacobson were partially supported by the NIH grant DP2 OD003021.

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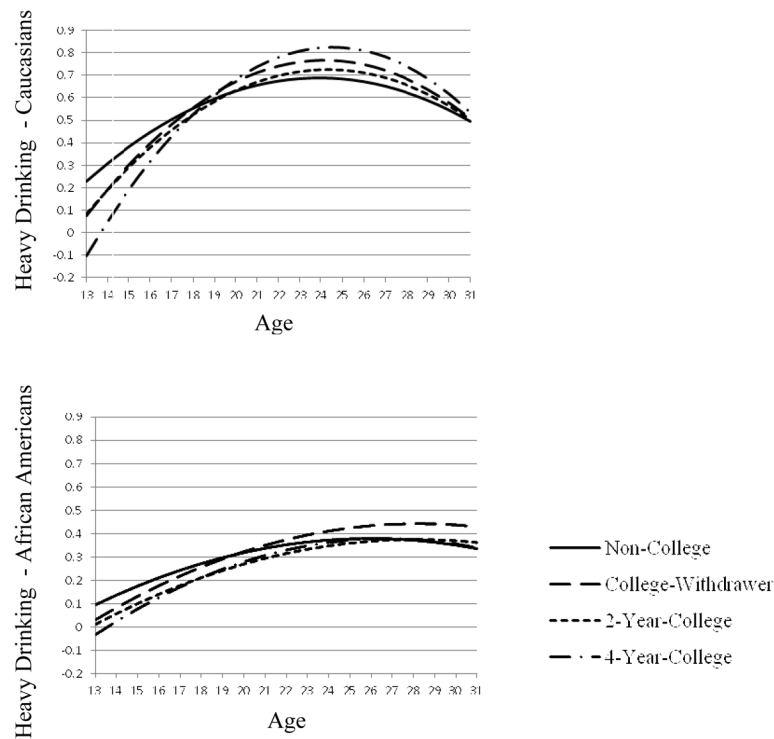


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### Implications and Contribution

This study is the first to examine racial differences in longitudinal relationships between college education and heavy drinking. Findings suggest that in later adulthood, college attendance may not have long-term risks on heavy drinking for Caucasians, whereas African American college withdrawers may be particularly vulnerable to developing alcohol use problems.



**Figure 1.** Racial Differences in Effects of College Education on Developmental Trajectories of Heavy Drinking

**Note. Between-group differences for Caucasians. Rates of Changes:** All between-group differences in rates of change were significant, except for differences between the college-withdrawer and the 2-year-college groups. **Levels of heavy drinking in adolescence:** The 4-year-college group had significantly lower levels of heavy drinking than the college-withdrawer and non-college groups at ages 13–18. The non-college group had significantly higher levels of heavy drinking than the 2-year-college group at ages 13–17, and significantly higher levels of heavy drinking than the college-withdrawer group at ages 13–16. The 2-year-college group had significantly higher levels of heavy drinking than the 4-year-college group at ages 13–16. Differences between the college-withdrawer and 2-year-college group were not significant at ages 13–18. None of the between-group differences were significant at age 19. **Levels of heavy drinking in adulthood:** The 4-year-college group had significant higher levels of heavy drinking than the non-college and 2-year-college groups at ages 20–29, and significantly higher levels of heavy drinking than the college-withdrawer group at ages 22–29. The college-withdrawer group had significantly higher levels of drinking than the non-college group at ages 20–29. The 2-year-college group did not differ significantly from either the college-withdrawer group or the non-college group at ages 20–29. Finally, at age 30, only the comparison between the 4-year-college and non-college groups was significant (with higher levels of heavy drinking in the 4-year-college group), and none of the between-group comparisons were significant at age 31. **Between-group differences for African Americans: Rates of change:** None of the between-group differences in rates of change of heavy drinking were significant. **Levels of heavy drinking in adolescence:** The 4-year-college group had significantly lower levels of heavy drinking than the non-college group at ages 13–19, and significantly lower levels of heavy drinking than the college-withdrawer group at ages 15–18. None of the other group comparisons were significant at ages 13–19. **Levels of heavy drinking in adulthood:** No significant between-

group differences were found at ages 20–25. The college-withdrawer group had significantly higher levels of drinking than the 4-year-college and the non-college groups at ages 26–31. None of the other between-group comparisons were significant at ages 26–31.

**Table 1**

Demographic characteristics of participants by college education status.

	Non-College	College-Withdrawer	2-Year-College	4-Year-College
Total N	3,315	2,267	762	3,644
African Americans	36.8%	24.8%	5.6%	32.8%
Caucasians	31.9%	21.9%	8.4%	37.8%
Males	38.4%	23.9%	6.9%	30.8%
Females	28.5%	21.6%	8.3%	41.6%
Parental Education (Mean/SD)	4.56/1.90	5.49/1.95	5.54/1.94	6.83/1.77

*Note.* The percentage of participants in each college education group was computed as the percentage *within* each gender and racial category and therefore sum to 100% across columns.

**Table 2**

Parameter estimates from hierarchical longitudinal multilevel models predicting heavy drinking.

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
<i>Intercept</i>	.4690***	.0485***	.2441***	.2732***
Male			-.1014***	-.1003***
Parental Education			-.0155***	-.0150***
African American			-.0302	-.1312***
College-Withdrawer			-.1257***	-.1520***
2-Year-College			-.1202***	-.1417***
4-Year-College			-.2753***	-.3310***
AA* College-Withdrawer				.0897
AA*2-Year-College				.0589
AA*4-Year-College				.2041***
<i>Linear Change (Age)</i>		.1057***	.0675***	.0586***
Male* Age			.0562***	.0559***
Parental Education* Age			.0069***	.0068***
African American* Age			-.0718***	-.0413***
College-Withdrawer* Age			.0307***	.0393***
2-Year-College* Age			.0206**	.0284**
4-Year-College* Age			.0560***	.0765***
AA* College-Withdrawer* Age				-.0291*
AA*2-Year-College* Age				-.0241
AA*4-Year-College* Age				-.0603***
<i>Quadratic Change (Age<sup>2</sup>)</i>		-.0046***	-.0033***	-.0029***
Male* Age <sup>2</sup>			-.0021***	-.0020***
Parental Education* Age <sup>2</sup>			-.0003***	-.0003***
African American* Age <sup>2</sup>			.0036***	.0022***
College-Withdrawer* Age <sup>2</sup>			-.0012***	-.0017***
2-Year-College* Age <sup>2</sup>			-.0007	-.0011*
4-Year-College* Age <sup>2</sup>			-.0024***	-.0031***
AA* College-Withdrawer* Age <sup>2</sup>				.0016**
AA*2-Year-College* Age <sup>2</sup>				.0012
AA*4-Year-College* Age <sup>2</sup>				.0026***
<b>Goodness-of-fit</b>				
$\chi^2$	58724.74	54339.10	52010.35	51960.21
Comparison model		1	2	3
$\Delta$ -2LL ( $\Delta$ df)		4385.64(3)***	2328.75(18)***	50.14(9)***
<b>Pseudo R<sup>2</sup></b>				
R <sub>e</sub> <sup>2</sup> (within-person)		27.6%	29.7%	29.8%

	Model 1	Model 2	Model 3	Model 4
R <sub>0</sub> <sup>2</sup> (level 2 initial status)			7.6%	7.6%
R <sub>1</sub> <sup>2</sup> (level 2 age)			12.3%	12.6%

*Note.* AA = African American. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Age was centered at age 13 for results shown in the table. Comparison groups are as follows: gender (0=female); race (0=Caucasians); college education (0=non-college participants). The positive estimate of the linear change and the negative estimate of the quadratic change shown in Model 2 indicate that levels of heavy drinking increased from age 13, reached a stationary point (i.e., the highest level) between ages 24–25, and then declined thereafter. The stationary point was calculated using the equation:  $-\text{Linear Change Estimate}/(2 \times \text{Quadratic Change Estimate}) + 13$ . The constant 13 was added as age was centered at 13 in analyses shown in the table. For two-way interactions between gender, race, and college education with age, a positive estimate indicates a faster rate of linear change for the non-comparison group(s) (i.e., levels of heavy drinking increased more rapidly from age 13 to mid-20s for the non-comparison group). For two-way interactions between gender, race, and college education with age<sup>2</sup>, a negative estimate indicates a faster rate of quadratic change for the non-comparison group(s) (i.e., levels of heavy drinking decreased more rapidly from mid-20s to age 31 for the non-comparison group).