

Alcohol Consumption in Early Adulthood and Schooling Completed and Labor Market Outcomes at Midlife by Race and Gender

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Alcohol consumption is relatively high among individuals in college or of college age.^{1–4} The short-term consequences of heavy drinking—emergency room visits,⁵ intimate partner violence,^{6–8} and motor vehicle fatalities,^{9,10} among others—are well documented. With a few exceptions,^{11,12} until recently a lack of longitudinal data has inhibited researchers' ability to track events occurring much later in the life course that are associated with alcohol consumption levels in early adulthood.

The alcohol consumption of Blacks tends to be similar to or less than that of Whites.^{13–18} However, this generalization obscures more subtle differences. For one, there is less of a decline in alcohol consumption after the early 20s among Blacks than Whites.¹⁹

Some studies, for example, of mortality and high-density lipoprotein cholesterol,^{20,21} have supported a conclusion of no difference between Blacks and Whites in the relation between alcohol consumption and various outcomes. However, other studies, which focused on alcohol use in early adulthood and subsequent occupational attainment (an index of the occupation's prestige), have found that heavy alcohol use in early adulthood is associated with lower occupational attainment in Blacks but not in Whites.^{22,23} These results came from 1 longitudinal database—the Coronary Artery Risk Development in Young Adults study—which was drawn from residents of 4 geographically disperse US cities.

Race is a social, not a biological, construct. There is substantially more variation genetically within than among racial categories.²⁴ Yet previous research has documented racial differences in psychosocial factors, which are highly correlated with both baseline drinking and long-term drinking trajectories.^{19,23,25,26} Important differences in outcomes among Blacks versus Whites have also been reported.^{22,23,27–29}

Objectives. We assessed the relation of alcohol consumption in young adulthood to problem alcohol consumption 10 years later and to educational attainment and labor market outcomes at midlife. We considered whether these relations differ between Blacks and Whites.

Methods. We classified individuals on the basis of their drinking frequency patterns with data from the 1982 to 1984 National Longitudinal Survey of Youth 1979 (respondents aged 19–27 years). We assessed alcohol consumption from the 1991 reinterview (respondents aged 26–34 years) and midlife outcomes from the 2006 reinterview (respondents aged 41–49 years).

Results. Black men who consumed 12 or more drinks per week at baseline had lower earnings at midlife, but no corresponding relation for Black women or Whites was found. Black men and Black women who consumed 12 or more drinks per week at baseline had lower occupational attainment than did White male non-drinkers and White female non-drinkers, respectively, but this result was not statistically significant.

Conclusions. The relation between alcohol consumption in young adulthood and important outcomes at midlife differed between Blacks and Whites and between Black men and Black women, although Blacks' alcohol consumption at baseline was lower on average than was that of Whites. (*Am J Public Health.* 2011;101:2093–2101. doi:10.2105/AJPH.2010.194159)

We investigated the relations of alcohol consumption to educational attainment and labor market outcomes at midlife and how these relations differ between Blacks and Whites. We used national longitudinal data from the National Longitudinal Survey of Youth 1979 (NLSY79) to assess (1) whether there are relations between an individual alcohol consumption level at 19 to 27 years of age and various outcomes at later stages in the life course (alcohol consumption, abuse, and dependence; educational attainment; occupational attainment; and earnings), and (2) whether these relations differ between Blacks and Whites in the full sample and when stratified by gender.

METHODS

The NLSY79 was a survey of 12 686 individuals at baseline. Youths with low incomes were initially oversampled; oversampled

low-income Whites were dropped from the NLSY79 reinterview sample in 1991. In 1979, sample individuals were aged 14 to 22 years. Individuals were reinterviewed annually until 1994 and biennially to 2006, the most recent public use file. Because alcohol consumption questions were first asked in 1982, we considered 1982 the base year.

Key covariates were 5 mutually exclusive baseline alcohol consumption measures.²² Because there was variation in week-to-week alcohol consumption, rather than select a single week as representative, we calculated mean responses per individual from the 1982 to 1984 NLSY79 interviews. Individuals who consumed no alcoholic beverages from 1982 to 1984 were nondrinkers, the omitted reference group; those who consumed at least 1 drink but less than 32 milliliters alcohol weekly were occasional drinkers. We included 3 additional baseline drinker categories for individuals who consumed (1) 32 to 111 milliliters weekly (the equivalent of

2–6 drinks), (2) 112 to 191 milliliters weekly (the equivalent of 7–11 drinks), or (3) 192 or more milliliters weekly (the equivalent of 12 or more drinks).

Outcome Measures

Our outcome measures fell into 3 categories: alcohol consumption, abuse, and dependence; final educational attainment; and labor market outcomes. Our measure of alcohol consumption, defined for 2006, was daily alcohol consumption in milliliters. Alcohol abuse and dependence^{15,30} were separately measured in 1994. We hypothesized that heavy drinking at baseline (1982–1984) would be associated with alcohol abuse or dependence a decade later.

In our analysis of years of schooling finally completed, we used data from 2006 interviews when respondents were aged 41 to 49 years. Although some individuals may have subsequently returned to school, this occurrence would be unusual.

We assessed labor market outcomes using occupational attainment and the natural logarithm of earnings from 2006 interviews. For occupational attainment, we used the Nam-Powers-Boyd Occupational Status Scale,³¹ derived from US Census occupation codes. The logarithm of earnings analysis included only individuals with positive earnings (82.3% of individuals with earnings information). To determine whether race in interaction with baseline alcohol consumption was associated with the probability of reporting positive earnings in 2006, we analyzed whether individuals reported positive earnings: dependent variable 1 with earnings of more than \$0, and 0 otherwise.

To be included in our analysis, we required the individual to have been interviewed at each wave from 1979 to 1984. Only individuals reporting Black or White race were included. Hispanic individuals and those reporting another race were excluded. Our analysis samples varied by dependent variable and gender: from 4374 (2195 men, 2179 women) for earnings to 5612 (2689 men, 2923 women) for educational attainment.

Equation Specification

For each outcome, we included a binary variable for Black race and female gender, binary variables for baseline alcohol consumption (occasional, 2–6, 7–11, and ≥ 12 drinks per

week), and interaction terms for each baseline alcohol consumption variable with Black race except for nondrinker, the omitted reference category. In regressions termed adjusted, we accounted for baseline values of (1) use of other substances (cigarettes, marijuana, other illicit substances) known to be positively correlated with alcohol consumption^{3,32–34}; (2) educational attainment (years of schooling completed) and ability (Armed Forces Qualification Test score), well-documented determinants of labor market success^{29,35–38}; (3) motivation (whether the individual planned to be a manager or professional by 35 years of age, self-assessed chance of being in the field the individual aspired to by 35 years of age) and long-term expectations (whether an individual's educational aspirations exceeded her or his expectations), also predictors of later labor market success; (4) physical (health=1 if no reported physical health limitations; 0 otherwise) and psychological health (Rosenberg Self-Esteem Scale, Rotter Internal–External Locus of Control Scale scores), which affect the individual's probability of making investments influencing her or his future desirability as an employee^{39–41}, and (5) preferences that are positively associated with an individual's discount rate (i.e., the tradeoff the individual makes between receiving a benefit today vs at some future date), which in turn potentially affects accumulation of human capital, criminality (measured by any conviction on a charge other than for a minor traffic offense),^{42,43} religiosity (number of times per week individual attended religious services),⁴⁴ and demographic characteristics (age, gender in gender pooled analysis only) associated with changes in educational attainment from baseline to midlife and with labor market success.

A major strength of the NLSY79 is that it contains various measures related to the respondent's motivation and long-term expectations. Individuals not motivated to accumulate human capital may be more likely to engage in heavy drinking. For example, the Rosenberg Self-Esteem Scale, administered by NLSY79 in 1980, is derived from responses to 10 questions designed to measure an individual's self-esteem. Individual responses range from 1 to 4, yielding an overall self-esteem scale of 10 to 40. The scale is a self-evaluation of self-esteem, and it has proven highly reliable, especially in high school- and college-aged individuals.⁴⁵

To construct the scale, certain responses must be recoded so that a higher score represents greater self-approval.⁴⁶ The Rotter Internal–External Locus of Control Scale, administered in 1979, was designed to gauge the extent to which respondents feel they control their lives. Scores range from 4 to 16, with lower scores signifying a higher degree of control of one's environment.

To measure educational aspirations, individuals were asked in 1982, “What is the highest grade or year of regular school . . . that [you] would like to complete?” Survey participants were also asked the highest grade they thought they would actually complete. On the basis of the responses, we defined 3 explanatory variables: educational aspirations, educational expectations, and a binary for whether aspirations exceeded expectations to capture the interaction between aspirations and expectations. Respondents were also asked about occupational aspirations for when they were aged 35 years. We created a binary variable for whether an individual planned to be a manager or a professional when aged 35 years. The NLSY79 in 1982 also asked respondents about their chances of getting into the work they aspired to by the time they were aged 35 years on a 4-point scale from excellent to poor. In defining the explanatory variable for being in work they aspired to by the time they were aged 35 years, we set responses of excellent or good to 1 and fair or poor to 0.

Statistical Analysis

We used ordinary least squares regression for analysis of daily alcohol consumption, educational and occupational attainment, and earnings. We used logit analysis for the probability of being an alcohol abuser, being alcohol dependent, or having nonzero earnings in 2006. We performed all analyses using a full sample and separately for men and women. We also used custom sample weights that reflected both the complex survey design and attrition.⁴⁷

The unadjusted specifications contained only variables for baseline drinking, race, gender, and interaction terms for baseline drinking and race. Results from the adjusted specifications merit greater attention because they adjust for some potentially confounding factors. We used Stata version 10.0 (StataCorp LP, College Station, TX).

Sample Attrition

We excluded individuals identified as Hispanics ($n=2002$), individuals subsequently discontinued by the NLSY79 ($n=2681$), and individuals missing any re-interviews between 1980 and 1984 ($n=764$) from the sample, leaving 7239 individuals, 5803 of whom were interviewed in 2006. We excluded an additional 191 individuals for whom we lacked data on covariates. The analysis with the highest number of observations, educational attainment, included 5612 observations; the analysis with the least number of observations, log earnings, included 4374. To determine whether heavy drinkers and heavy drinkers by race were more or less likely to be included in our analyses, we estimated equations with binary variables defined as 1 for included in the analysis and 0 for excluded. Overall, alcohol consumption at baseline was not predictive of being included in our analysis. Black men, Black women, White women, and individuals who scored higher on the Armed Forces Qualification Test were more likely to be included, whereas individuals in good health, delinquents, and individuals aspiring to be a manager or professional by the time they were aged 35 years were less likely to be included in our analysis. There was no interaction between race and baseline alcohol consumption and the probability of being included in our analysis.

RESULTS

Thirty-eight percent of sample individuals at baseline were Black (Table 1). The sample consisted of 27.6% nondrinkers, 24.1% occasional drinkers, 25.7% who consumed 2 to 6 drinks per week, 10.7% who consumed 7 to 11 drinks per week, and 11.9% who consumed 12 or more drinks per week at baseline. Higher proportions of Black men were nondrinkers or occasional drinkers compared with White men ($P<.001$ for both), whereas White men were significantly more likely to consume 7 to 11 and 12 or more drinks weekly than were Black men ($P<.001$). Women's drinking patterns were similar, differing only in that White women were also significantly more likely to consume 2 to 6 drinks daily than were Black women ($P<.001$).

Drinking in early adulthood was predictive of drinking at midlife. By 2006, baseline

nondrinkers consumed 0.13 drinks per day on average (data available as a supplement to the online version of this article at <http://www.ajph.org>); occasional drinkers consumed 0.27 drinks per day on average; 2 to 6 per week drinkers consumed 0.43 drinks per day on average; 7 to 11 per week drinkers consumed 0.69 drinks per day on average; and 12 or more per week drinkers consumed 0.97 drinks daily. Differences between adjacent categories were all statistically significant, although the differences were much smaller in 2006 than at baseline.

Stratified by race and gender, the only statistically significant difference in alcohol consumption was for women occasional drinkers ($P<.05$). However, White men's and White women's drinking pattern trajectory differed over time compared with that of Black men and Black women (Figure 1), with White men and White women tending to decrease consumption in the first few years after baseline. Black men and Black women with relatively high levels of consumption at baseline increased or did not change consumption for several years post baseline.

Daily Alcohol Consumption in 2006 and Alcohol Abuse and Dependence in 1994

In multivariate analysis, consumption was lower in 2006 than it was from 1982 to 1984: 6.7 milliliters per day in 2006 versus 10.8 milliliters per day from 1982 to 1984. The coefficients on the baseline alcohol consumption variables increased monotonically according to the extent that the individual consumed alcohol at baseline (data available as a supplement to the online version of this article at <http://www.ajph.org>). However, no coefficients on the race baseline alcohol consumption interaction terms were statistically significant, implying no difference in the relation between baseline and 2006 consumption by Black versus White race.

Results for alcohol abuse and dependence were similar to each other. Baseline drinking categories were highly predictive of alcohol abuse and dependence in 1994 (data available as a supplement to the online version of this article at <http://www.ajph.org>). Odds ratios increased monotonically according to the extent that the individual consumed alcohol at baseline but were slightly lower in adjusted than in unadjusted specifications.

Stratifying alcohol consumption analyses by gender, we found no statistically significant interactions between Black race and alcohol consumption for milliliters per day or alcohol abuse for men or women. We accepted the null hypothesis of no race baseline alcohol consumption interaction except in analysis of alcohol dependence for women, in which the interaction variable of Black race and 12 or more drinks weekly was associated with a 14-fold increase in alcohol dependence risk.

Educational Attainment at Midlife

In the unadjusted specification, all interaction terms of Black race and alcohol consumption categories were significantly associated with reduced final educational attainment, with coefficients ranging from nearly one half of a school year for Black occasional drinkers to more than a full year for Blacks who consumed 7 to 11 drinks and Blacks who consumed more than this amount per week (Table 2). However, with other covariates, interaction terms were not significantly associated with educational attainment.

Stratifying by gender, in the unadjusted specifications for men, we found that Blacks and Blacks who consumed 12 or more drinks per week at baseline had relatively lower final years of schooling completed than did White nondrinkers (Table 3). However, considering years of schooling completed at baseline and other covariates, no statistically significant results for baseline drinking in interaction with Black race on final years of schooling completed remained for men. For women, however, Blacks in the highest baseline drinking category had much lower levels of completed schooling in the unadjusted specification. The parameter estimate for this interaction translates into three quarters of a year reduction in final years of schooling completed. Caution is warranted because, although statistically significant, the parameter estimate is derived from only 13 women.

Labor Market Outcomes

In the unadjusted specification (Table 2), there are several negative interactions between alcohol consumption at baseline and Black race, implying that for Blacks overall, higher levels of alcohol consumption in early

TABLE 1—Descriptive Statistics: National Longitudinal Survey of Youth, United States, 1979–2006

Variables	Men		Women	
	White (n=1651)	Black (n=1038)	White (n=1807)	Black (n=1116)
Dependent variables, measured 1994 or 2006				
Alcohol drunk/d 2006, mL, mean	10.636	8.549**	4.552	2.540***
Alcohol abuser 1994, %	17.7	14.6*	3.5	7.7***
Alcohol dependent 1994, %	5.3	8.0**	2.0	1.5
Educational attainment 2006, y, mean	13.740	12.822***	13.915	13.292***
Log _e yearly earnings 2006, mean	10.797	10.290***	10.144	10.030*
Yearly earnings 2006, \$, mean	68 106	43 193***	37 626	31 398***
Nam-Powers-Boyd occupational prestige 2006, ^a mean	59.008	44.214***	56.425	46.487***
Explanatory variables, measured 1979–1984				
Alcohol drunk/d 1982–1984, mL, mean	19.781	10.331***	7.823	2.973***
Drinking frequency, %				
Nondrinker	14.5	25.3***	28.2	47.9***
Occasional drinker ^b	14.4	23.7***	27.6	33.1**
2–6 drinks/wk	28.1	29.8	27.9	14.9***
7–11 drinks/wk	16.5	10.2***	10.5	3.0***
≥12 drinks/wk	26.5	11.0***	5.8	1.2***
Tobacco and other drug use, %				
Smoked cigarettes	39.2	47.3**	42.6	37.4*
Smoked marijuana	24.1	28.3*	13.5	14.6
Consumed other illicit drugs	8.9	5.3*	7.8	3.2***
Armed Forces Qualification Test score, %, mean	54.279	21.585***	53.357	22.407***
Educational attainment in 1982, y, mean	12.155	11.634***	12.321	11.976***
Age (in 1982/10), y, mean	2.048	2.050	2.062	2.058
No health limitations, %	96.1	95.9	92.8	91.5
Ever convicted of a crime, %	8.2	7.1	1.5	1.0
Marital status, %				
Married	17.5	9.1***	29.9	12.8***
Divorced or other unmarried	2.2	2.0	6.1	5.6
Income (in \$10 000s)	22.5	11.8***	19.5	11.4***
Unemployed, %	12.2	21.9***	10.4	20.3***
Out of the labor force, %	19.3	21.6	27.8	38.7***
Church attendance, no. of times/wk, mean	0.361	0.404*	0.451	0.548***
Rosenberg self-esteem score, ^c mean	32.695	32.333*	32.291	32.156
Rotter scale score, ^d mean	9.085	9.232	9.028	9.452***
Education goals				
Highest educational attainment aspiration, y, mean	14.474	14.457	14.488	14.705**
Highest educational attainment expected, y, mean	14.049	13.871	14.033	14.206*
Expect to achieve lower educational attainment than hope for, %	18.5	25.1*	20.6	23.7
Employment goals, %				
Plan to be manager or professional by age 35 y	48.5	46.8	36.6	39.3
Expect to achieve employment goals by age 35 y	63.1	59.9	63.5	63.2

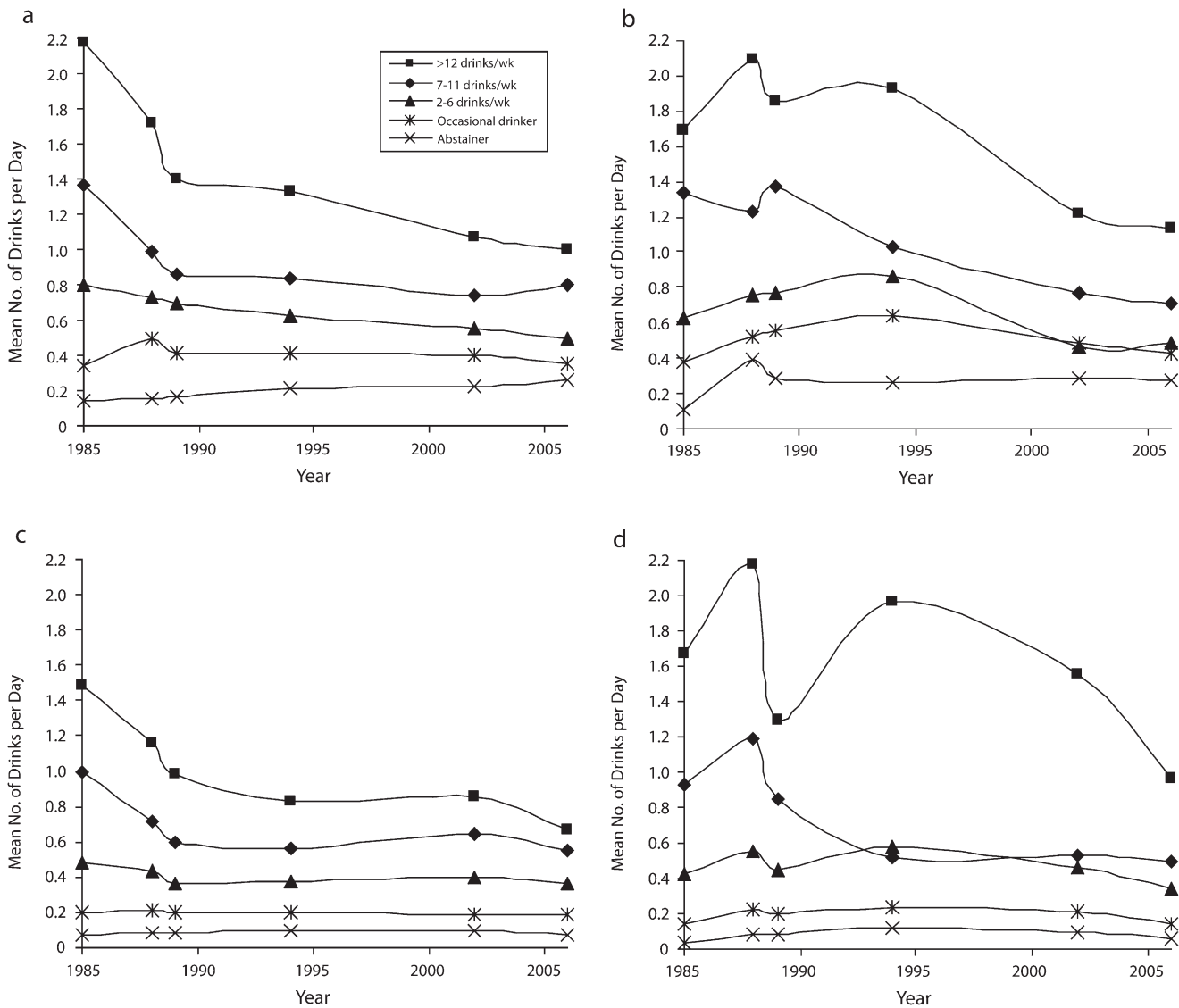
^aRange of potential scores was 0–100.

^bDefined as ≤1 drink/week.

^cRange of potential scores was 10–40.

^dRange of potential scores was 4–16.

P* < .05; *P* < .01; ****P* < .001.



Note. Occasional drinker defined as ≤ 1 drink/week.

FIGURE 1—Drinks per day by baseline drinking category among (a) White men, (b) Black men, (c) White women, and (d) Black women: National Longitudinal Survey of Youth, 1979–2006.

adulthood reduce occupational attainment at midlife. However, statistical significance is lacking in the corresponding adjusted specification. The interaction of Black race and consuming 7 to 11 and 12 or more drinks at baseline is negative and substantial but not significant ($P=.17$ and $P=.18$, respectively).

The interaction terms between Black and all alcohol consumption categories were not significantly associated with having positive earnings in 2006 in the adjusted specification

(results not shown). For log earnings in 2006, the interaction term between Black race and consuming 12 or more drinks per week was associated with decreased earnings (coefficient: -0.46 ; SE: 0.15; Table 2) relative to White drinkers in this baseline category. Adjusting for other covariates slightly attenuated the effect of being in the Black and 12 or more drinks per week category (coefficient: -0.35 ; SE: 0.14); this result remained statistically significant and implies that very heavy alcohol consumption reduced Blacks' earnings

by an average of 13.2% relative to White baseline nondrinkers.

Considering men and women separately, for men, interaction terms between Black race and all alcohol consumption categories were significantly associated with decreased earnings, except for the interaction between Black race and 7 to 11 drinks weekly (Table 3). Conversely, for women, the interaction terms between Black race and occasionally consuming alcohol and consuming 2 to 6 drinks weekly were both significantly associated with higher earnings.

TABLE 2—Parameter Estimates of Education, Occupation, and Earnings Outcomes: National Longitudinal Survey of Youth, United States, 1979–2006

	Educational Attainment		Occupational Prestige		Log _e Earnings	
	Adjusted ^a	Unadjusted ^b	Adjusted	Unadjusted	Adjusted	Unadjusted
No. observations	5612	5612	4830	4830	4374	4374
Black, b (SE)	0.061 (0.090)	-0.355* (0.130)	-0.938 (1.425)	-8.905* (1.557)	0.087 (0.060)	-0.177* (0.058)
× occasional drinker ^c	-0.104 (0.119)	-0.458* (0.196)	-0.036 (1.896)	-3.504 (2.221)	-0.017 (0.081)	-0.112 (0.090)
× 2–6 drinks/wk	-0.157 (0.115)	-0.742* (0.201)	-1.156 (1.903)	-4.881* (2.287)	-0.049 (0.087)	-0.160 (0.091)
× 7–11 drinks/wk	-0.152 (0.158)	-1.015* (0.281)	-3.774 (2.734)	-9.656* (3.351)	-0.126 (0.122)	-0.229 (0.131)
× ≥12 drinks/wk	-0.166 (0.158)	-1.129* (0.263)	-3.915 (2.949)	-10.155* (3.095)	-0.345* (0.135)	-0.459* (0.145)
Drinking frequency, b (SE)						
Occasional drinker ^c	-0.048 (0.093)	0.327* (0.155)	-0.688 (1.370)	2.679 (1.608)	-0.009 (0.054)	0.060 (0.058)
2–6 drinks/wk	0.027 (0.081)	0.622* (0.145)	-0.259 (1.344)	4.009* (1.544)	0.050 (0.054)	0.136* (0.055)
7–11 drinks/wk	-0.213 (0.108)	0.358 (0.195)	0.264 (1.616)	4.146* (1.766)	0.083 (0.069)	0.139* (0.070)
≥12 drinks/wk	-0.142 (0.106)	0.260 (0.174)	-0.445 (1.779)	1.868 (1.924)	0.203 (0.078)	0.159* (0.079)
Women, b (SE)	0.075 (0.050)	0.247* (0.082)	-0.740 (0.865)	0.044 (0.969)	-0.415 (0.038)	-0.416* (0.040)
F test: joint hypothesis test for interaction terms	0.59	7.29	0.89	3.96	1.84	2.99
Reject null hypothesis?	No	Yes	No	Yes	No	Yes

^aAdjusted specification includes covariates for whether an individual consumed alcohol occasionally, consumed 2–6 drinks/week, consumed 7–11 drinks/week, consumed ≥12 drinks/week, smoked cigarettes, smoked marijuana, consumed other drugs, Armed Forces Qualification Test, educational attainment, age, height, health limitations, urban residence, delinquency, marital status, household income, employment status, religiosity, Rosenberg Self-Esteem Score, Rotter Scale Score, and educational and occupational aspirations.

^bUnadjusted specification includes only those covariates reported in the table.

^cDefined as ≤1 drink/week.

**P* = .05.

DISCUSSION

We found different drinking patterns over the life course by race; but the most noteworthy was in the relation between heavy drinking at baseline and earnings 22 years later for Blacks and the lack of a corresponding relation for Whites. Importantly, this difference was borne entirely by Black men.

Our results, using national data, lend support to the findings of Braun et al.²² and Sloan et al.,²³ who used the Coronary Artery Risk Development in Young Adults study, that heavy alcohol use in early adulthood reduced subsequent occupational attainment for Blacks but not for Whites. However, although the signs and magnitudes of the coefficients in our study imply a relation, statistical significance at conventional levels is lacking.

Using the change in family income, Braun et al.²² reported that Black women experienced substantial losses in household income as the result of daily drinking, whereas White men and White women who engaged in daily drinking were more likely to experience income increases. The Coronary Artery Risk Development in

Young Adults study did not obtain information on the earnings of individual household members, which alcohol use would likely more directly affect than would household income. Counter to Braun's findings, using the log of personal earnings we found that Black men, and not Black women, experienced substantial losses in log earnings as the result of heavy baseline drinking.

One potential reason for the discrepancy in associations between baseline drinking and midlife outcomes for Blacks and Whites is that Blacks and Whites follow different alcohol consumption trajectories along the life course.^{13,19,22,23} Our results on trajectories of alcohol consumption from young adulthood to midlife are consistent with the findings of others derived from analyses of other databases: whereas White heavy drinkers tended to reduce alcohol consumption levels, Blacks did not.^{13,19,22,23} In our study, Blacks who engaged in heavy drinking at baseline on average did eventually reduce their alcohol consumption; however, mean consumption levels remained high for nearly a decade. White heavy drinkers, by contrast, realized almost immediate reductions in heavy drinking after early adulthood.

Although rates of consumption at midlife stratified by baseline alcohol consumption categories were quite similar for Blacks and Whites, differences in consumption at intermediate periods may explain some of our results on outcomes.

Baseline drinking and long-term drinking trajectories are highly correlated with psychosocial traits.^{19,23,25,26} Costanzo et al.¹⁹ reported that psychologically vulnerable individuals may be at increased risk of continuing along a heavy drinking trajectory into midlife and that a disproportionate number of Blacks were psychologically vulnerable. Sloan et al.²³ found that Blacks had higher levels of stress and higher active coping scores than Whites, implying that Blacks had experienced more adverse life events that required coping. Whereas our analysis included such variables as the Rosenberg Self-Esteem Scale and Rotter's Internal–External Control Scale to partially account for psychological characteristics, the NLSY79 lacks measures of stress and other psychosocial measures. Another potential source of differences by race is the higher burden of undertreated or undiagnosed mental illness among Blacks,^{48–51} a factor NLSY79 did not measure.

TABLE 3—Parameter Estimates of Education, Occupation, and Earnings Outcomes Stratified by Gender: National Longitudinal Survey of Youth, United States, 1979–2006

	Educational Attainment, b (SE)		Occupational Prestige, b (SE)		Log _e Earnings, b (SE)	
	Adjusted ^a	Unadjusted ^b	Adjusted	Unadjusted	Adjusted	Unadjusted
Men						
Black × occasional drinker ^c	-0.198 (0.208)	-0.410 (0.385)	-3.024 (3.105)	-5.754 (3.708)	-0.409* (0.122)	-0.532* (0.139)
Black × 2–6 drinks/wk	-0.206 (0.172)	-0.348 (0.339)	-2.082 (2.861)	-2.349 (3.438)	-0.360* (0.126)	-0.379* (0.129)
Black × 7–11 drinks/wk	-0.304 (0.215)	-0.700 (0.407)	-4.471 (3.564)	-6.443 (4.343)	-0.202 (0.153)	-0.233 (0.158)
Black × ≥12 drinks/wk	-0.141 (0.198)	-0.797* (0.358)	-4.746 (3.539)	-7.439 (3.883)	-0.491* (0.153)	-0.511* (0.166)
Black	0.156 (0.144)	-0.734* (0.257)	-0.404 (2.354)	-12.048* (2.640)	0.166 (0.091)	-0.198* (0.084)
F test: joint hypothesis test for interaction terms	0.60	1.46	0.64	1.32	4.31	5.01
Reject null hypothesis?	No	No	No	No	Yes	Yes
No. observations	2689	2689	2417	2417	2195	2195
Women						
Black × occasional drinker ^c	-0.074 (0.144)	-0.434 (0.223)	1.557 (2.410)	-1.572 (2.769)	0.227* (0.106)	0.142 (0.113)
Black × 2–6 drinks/wk	-0.104 (0.167)	0.968* (0.272)	0.345 (2.712)	6.525* (3.321)	0.349* (0.114)	0.127 (0.123)
Black × 7–11 drinks/wk	0.178 (0.253)	-0.948 (0.496)	-3.211 (4.793)	-12.589* (6.358)	0.082 (0.222)	-0.146 (0.280)
Black × ≥12 drinks/wk	0.770* (0.360)	-1.097 (0.676)	-2.951 (9.215)	-8.593 (9.243)	0.079 (0.342)	-0.116 (0.346)
Black	0.009 (0.118)	-0.187 (0.147)	-1.846 (1.832)	-7.369* (1.910)	0.013 (0.081)	-0.167* (0.077)
F test: joint hypothesis test for interaction terms	1.46	4.00	0.31	1.84	2.61	0.72
Reject null hypothesis?	No	Yes	No	No	Yes	No
No. observations	2923	2923	2413	2413	2179	2179

^aAdjusted specification includes covariates for whether an individual consumed alcohol occasionally, consumed 2–6 drinks/week, consumed 7–11 drinks/week, consumed ≥12 drinks/week, smoked cigarettes, smoked marijuana, consumed other drugs, Armed Forces Qualification Test, educational attainment, age, height, health limitations, urban residence, delinquency, marital status, household income, employment status, religiosity, Rosenberg Self-Esteem Score, Rotter Scale Score, and educational and occupational aspirations.

^bUnadjusted specification includes only those covariates reported in the table.

^cDefined as ≤1 drink/week.

**P* = .05.

Finally, heavy alcohol consumption has been linked to a decrease in educational attainment, which may explain the pathway through which heavy alcohol consumption negatively affects earnings and occupational prestige.^{23,52,53} Further, educational attainment gaps continue between Blacks and Whites, and Blacks are more likely to change their educational expectations.^{54,55} However, in this study we found that, accounting for other covariates, the interaction between Black race and alcohol consumption at baseline was not associated with lower educational attainment in either analysis pooled by gender or in specifications that stratified by gender.

Strengths of our study include the consideration of use of other substances at baseline in addition to alcohol use. Other factors may be correlated with alcohol use at baseline, such as educational and occupational aspirations and expectations; ability as measured by the Armed Forces Qualification Test; variables correlated with race (e.g., family

income); and the analysis of educational and labor market outcomes at midlife. Other strengths are the longitudinal data representative of the US population in the study age group and the length of follow-up.

We acknowledge several study limitations. First, direct information on the causal mechanisms through which alcohol consumption most affected outcomes is lacking. Second, despite steps we took to reduce endogeneity of alcohol use, the results do not permit causal inferences. Although the possibility of selection bias exists for the analysis of earnings, we performed an analysis of all individuals interviewed in 2006 and found that Blacks were no more likely to be unemployed than were Whites. Third, NLSY79 does not ask about mental illness, a condition more likely to go untreated among Blacks.^{48,49}

Relations between alcohol consumption in young adulthood and important outcomes at midlife, predominantly labor market outcomes,

differed between Blacks and Whites even though the alcohol consumption of Blacks at baseline was lower on average than was that of Whites. This result was most pronounced for Black men. Specifics of the relations in this study differed somewhat from previous research, most likely in large part because of differences in the samples. Particularly because we accounted for various socioeconomic and other factors that were correlated with race in our analysis—more so than previous studies did—it seemed less likely that other factors leading to disparities in outcomes between the 2 races were at work. Further research assessing these disparities and their effects on relations between alcohol consumption in young adulthood and important outcomes at midlife should be a high priority. ■

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Contributors

Both authors contributed to the conceptualization of the study and were involved in preparing the article. D.S. Grossman conducted the statistical analysis.

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Human Participant Protection

The study used restricted use data. The Duke University institutional review board approved this study.

References

- Colby SM, Colby JJ, Raymond GA. College versus the real world: student perceptions and implications for understanding heavy drinking among college students. *Addict Behav.* 2009;34(1):17–27.
- Gfroerer JC, Greenblatt JC, Wright DA. Substance use in the US college-age population: differences according to educational status and living arrangement. *Am J Public Health.* 1997;87(1):62–65.
- Wechsler H, Dowdall GW, Davenport A, Castillo S. Correlates of college-student binge drinking. *Am J Public Health.* 1995;85(7):921–926.
- Wechsler H, Lee JE, Kuo M, Sebring M, Nelson TF, Lee H. Trends in college binge drinking during a period of increased prevention efforts. Findings from 4 Harvard School of Public Health College Alcohol Study surveys: 1993–2001. *J Am Coll Health.* 2002;50(5):203–217.
- Cherpitel CJ. Alcohol and injuries: a review of international emergency room studies since 1995. *Drug Alcohol Rev.* 2007;26(2):201–214.
- Bell NS, Harford TC, Fuchs CH, McCarroll JE, Schwartz CE. Spouse abuse and alcohol problems among White, African American, and Hispanic US Army soldiers. *Alcohol Clin Exp Res.* 2006;30(10):1721–1733.
- Caetano R, Schafer J, Cunradi CB. Alcohol-related intimate partner violence among White, Black, and Hispanic couples in the United States. *Alcohol Res Health.* 2001;25(1):58–65.
- Cunradi CB, Caetano R, Schafer J. Alcohol-related problems, drug use, and male intimate partner violence severity among US couples. *Alcohol Clin Exp Res.* 2002;26(4):493–500.
- Sloan FA, Reilly BA, Schenzler C. Effects of prices, civil and criminal sanctions, and law-enforcement on alcohol-related mortality. *J Stud Alcohol.* 1994;55(4):454–465.
- Wagenaar AC, Maldonado-Molina MM, Ma L, Tobler AL, Komro KA. Effects of legal BAC limits on fatal crash involvement: analyses of 28 states from 1976 through 2002. *J Safety Res.* 2007;38(5):493–499.
- Bartholow BD, Sher KJ, Krull JL. Changes in heavy drinking over the third decade of life as a function of collegiate fraternity and sorority involvement: a prospective, multilevel analysis. *Health Psychol.* 2003;22(6):616–626.
- Sher KJ, Bartholow BD, Nanda S. Short- and long-term effects of fraternity and sorority membership on heavy drinking: a social norms perspective. *Psychol Addict Behav.* 2001;15(1):42–51.
- Caetano R, Kaskutas LA. Changes in drinking patterns among Whites, Blacks and Hispanics, 1984–1992. *J Stud Alcohol.* 1995;56(5):558–565.
- Gilman SE, Breslau J, Conron KJ, Koenen KC, Subramanian SV, Zaslavsky AM. Education and race-ethnicity differences in the lifetime risk of alcohol dependence. *J Epidemiol Community Health.* 2008;62(3):224–230.
- Grant BF, Stinson FS, Harford TC. Age at onset of alcohol use and DSM-IV alcohol abuse and dependence: a 12-year follow-up. *J Subst Abuse.* 2001;13(4):493–504.
- Keng SH, Huffman WE. Binge drinking and labor market success: a longitudinal study on young people. *J Popul Econ.* 2007;20(1):35–54.
- Nyaronga D, Greenfield TK, McDaniel PA. Drinking context and drinking problems among Black, White, and Hispanic men and women in the 1984, 1995, and 2005 US National Alcohol surveys. *J Stud Alcohol Drugs.* 2009;70(1):16–26.
- Pletcher MJ, Varosy P, Kiefe CI, Lewis CE, Sidney S, Hulley SB. Alcohol consumption, binge drinking, and early coronary calcification: findings from the Coronary Artery Risk Development in Young Adults (CARDIA) study. *Am J Epidemiol.* 2005;161(5):423–433.
- Costanzo PR, Malone PS, Belsk D, Kertesz S, Pletcher M, Sloan FA. Longitudinal differences in alcohol use in early adulthood. *J Stud Alcohol Drugs.* 2007;68(5):727–737.
- Klatsky AL, Udaltsova N. Alcohol drinking and total mortality risk. *Ann Epidemiol.* 2007;17(5):S63–S67.
- Linn S, Carroll M, Johnson C, Fulwood R, Kalsbeek W, Briefel R. High-density-lipoprotein cholesterol and alcohol-consumption in United States White and Black adults: data from NHANES-II. *Am J Public Health.* 1993;83(6):811–816.
- Braun BL, Hannan P, Wolfson M, Jones-Webb R, Sidney S. Occupational attainment, smoking, alcohol intake, and marijuana use: ethnic-gender differences in the CARDIA study. *Addict Behav.* 2000;25(3):399–414.
- Sloan FA, Malone PS, Kertesz SG, Wang Y, Costanzo PR. Racial differences in the relationship between alcohol consumption in early adulthood and occupational attainment at midlife. *Am J Public Health.* 2009;99(12):2261–2267.
- Brown RA, Armelagos GJ. Apportionment of racial diversity: a review. *Evol Anthropol.* 2001;10(1):34–40.
- Cerda M, Vlahov D, Tracy M, Galea S. Alcohol use trajectories among adults in an urban area after a disaster: evidence from a population-based cohort study. *Addiction.* 2008;103(8):1296–1307.
- Chassin L, Pitts SC, Prost J. Binge drinking trajectories from adolescence to emerging adulthood in a high-risk sample: predictors and substance abuse outcomes. *J Consult Clin Psychol.* 2002;70(1):67–78.
- Blackburn ML. The role of test scores in explaining race and gender differences in wages. *Econ Educ Rev.* 2004;23(6):555–576.
- Blau FD, Beller AH. Black–White earnings over the 1970s and 1980s: gender differences in trends. *Rev Econ Stat.* 1992;74(2):276–286.
- Neal DA, Johnson WR. The role of premarket factors in Black–White wage differences. *J Polit Econ.* 1996;104(5):869–895.
- Harford TC, Muthen BO. The dimensionality of alcohol abuse and dependence: a multivariate analysis of DSM-IV symptom items in the National Longitudinal Survey of Youth. *J Stud Alcohol.* 2001;62(2):150–157.
- Nam CB, Boyd M. Occupational status in 2000: over a century of census-based measurement. *Popul Res Policy Rev.* 2004;23(4):327–358.
- Dee TS. The complementarity of teen smoking and drinking. *J Health Econ.* 1999;18(6):769–793.
- McKee SA, Falba T, O'Malley SS, Sindelar J, O'Connor PG. Smoking status as a clinical indicator for alcohol misuse in US adults. *Arch Intern Med.* 2007;167(7):716–721.
- Picone GA, Sloan F, Trogon JG. The effect of the tobacco settlement and smoking bans on alcohol consumption. *Health Econ.* 2004;13(10):1063–1080.
- Angrist JD, Krueger AB. Does compulsory school attendance affect schooling and earnings. *Q J Econ.* 1991;106(4):979–1014.
- Card D, Krueger AB. Does school quality matter? Returns to education and the characteristics of public schools in the United States. *J Polit Econ.* 1992;100(1):1–40.
- Hansen KT, Heckman JJ, Mullen KJ. The effect of schooling and ability on achievement test scores. *J Econom.* 2004;121(1–2):39–98.
- O'Neill J. The role of human capital in earnings differences between Black and White men. *J Econ Perspect.* 1990;4(4):25–45.
- Cebi M. Locus of control and human capital investment revisited. *J Hum Resour.* 2007;42(4):919–932.
- Coleman M, DeLeire T. An economic model of locus of control and the human capital investment decision. *J Hum Resour.* 2003;38(3):701–721.
- Waddell GR. Labor market consequences of poor attitude and low self-esteem in youth. *Econ Inq.* 2006;44(1):69–97.
- Grogger J. Arrests, persistent youth joblessness, and Black–White employment differentials. *Rev Econ Stat.* 1992;74(1):100–106.
- Healey A, Knapp M, Farrington DP. Adult labour market implications of antisocial behaviour in childhood and adolescence: findings from a UK longitudinal study. *Appl Econ.* 2004;36(2):93–105.

44. Lipford JW, Tollison RD. Religious participation and income. *J Econ Behav Organ*. 2003;51(2):249–260.
45. Rosenberg M. *Society and the Adolescent Self-Image*. Princeton, NJ: Princeton University Press; 1965.
46. Crandal R. The measurement of self-esteem and related constructs. In: Robinson JP, Shaver PR, eds. *Measures of Social Psychological Attitudes*. Revised ed. Ann Arbor, MI: Institute of Social Research; 1973:80–82.
47. US Dept of Labor, Bureau of Labor Statistics. NLSY79 (1979–2008). Available at: <https://www.nlsinfo.org/investigator/pages/weights.jsp?c=nlsy79>. Accessed June 7, 2010.
48. Schnitker J. Misgivings of medicine? African Americans' skepticism of psychiatric medication. *J Health Soc Behav*. 2003;44(4):506–524.
49. US Dept of Health and Human Services. *Mental Health: Culture, Race, and Ethnicity: A Supplement to "Mental Health: A Report of the Surgeon General."* Rockville, MD: US Dept of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services; 2001.
50. Whaley AL. Cultural mistrust and mental health services for African Americans: a review and meta-analysis. *Couns Psychol*. 2001;29(4):513–531.
51. Whaley AL. Ethnicity/race, paranoia, and hospitalization for mental health problems among men. *Am J Public Health*. 2004;94(1):78–81.
52. Renna F. The economic cost of teen drinking: late graduation and lowered earnings. *Health Econ*. 2007;16(4):407–419.
53. Wood MD, Sher KJ, McGowan AK. Collegiate alcohol involvement and role attainment in early adulthood: findings from a prospective high-risk study. *J Stud Alcohol*. 2000;61(2):278–289.
54. Kao G, Thompson JS. Racial and ethnic stratification in educational achievement and attainment. *Annu Rev Sociol*. 2003;29:417–442.
55. Kao G, Tienda M. Educational aspirations of minority youth. *Am J Educ*. 1998;106(3):349–384.