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Driving After Drinking Among Young Adults of Different Race/Ethnicities in the United States: Unique Risk Factors in Early Adolescence?

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 A B S T R A C T

Purpose: National guidelines for alcohol screening and brief interventions advise practitioners to consider age, drinking frequency, and context to identify at-risk youth. The purpose of this study was to identify the contextual risk and protective factors in high school-aged adolescents associated with future driving after drinking (Drinking Under the Influence [DUI] at age 21) by race/ethnicity.

Methods: Data included 10,271 adolescents (67% white, 12% Hispanic, 16% black, 3.6% Asian; 49% Male) who participated in the National Longitudinal Study of Adolescent Health (Waves I, II, and III) from 1995 to 2001. A lagged panel design and survey logistic regression was used to examine the association between multiple contextual factors (e.g., demographics, parents, peers, social context) during adolescence and self-reported DUI in young adulthood.

Results: As expected, the likelihood of DUI was higher among whites followed by Hispanics, Asians, and blacks in all models. Perception of easy home access to alcohol increased risk for future DUI for whites (OR: 1.25 CI: 1.04–1.49), Hispanics (OR: 2.02 CI: 1.29–3.16), and Asians (OR: 1.90 CI: 1.13–3.22), but not for black youth. Drinking frequency and prior DUI were not risk factors for Hispanics. Risk-taking attitudes, marijuana use, and religious affiliation were risk factors for whites only.

Conclusions: Findings suggest that in addition to screening for drinking behaviors, brief interventions and prevention efforts should assess perceived home access to alcohol and other race-specific factors to reduce alcohol-related injuries and harm.

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IMPLICATIONS AND CONTRIBUTION

Adolescents of different race/ethnicities share parental access to alcohol as a risk factor for driving under the influence of alcohol as young adults. Several race-specific unique risk factors, such as binge drinking for black youth, can inform screening and prevention to reduce alcohol-related harm.

Driving while under the influence of alcohol (DUI) is prevalent in the United States. Between 2006 and 2009, the National Survey on Drug Use and Health reported that at least 30.6 million people aged 16 or older drove under the influence of alcohol [1]. In the general population, the risk of DUI rapidly increases during adolescence, and the DUI rate doubles between the ages of 16-to-17 years old and 18-to-19 years old. The risk continues to increase until age 21-to-25 years, when the rate of past-year

and 30-day DUI is higher than any other age group [2,3]. Each year, nearly 11,000 motor vehicle deaths are attributable to alcohol [4]. The risk of alcohol-attributable motor vehicle fatalities among young adults follows a trajectory similar to that of DUI. It more than doubles when comparing those under 16 to those 16-to-20 years old (7.2% vs. 18.8%) and is highest for 21-to-24-year-olds (34.5%) [5].

Prevention-driven DUI research must understand the risk and protective factors for adolescents prior to reaching peak risk in their early twenties. Increasing our understanding can inform clinical tools such as the “Alcohol Screening and Brief Intervention for Youth: A Practitioner’s Guide” published by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) [6]. This screening guide presents an age and drinking frequency-based

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algorithm for assessing, together with the practitioner's knowledge of the patient, the likelihood of problematic drinking. As driving after drinking is one of multiple harmful consequences of problematic drinking, a clinical tool may help identify youth at most risk of alcohol-related injuries and harm.

Important differences in DUI prevalence exist within and between races/ethnicities. In a 2010 "Special Report on Race/Ethnicity and Impaired Driving" prepared for the National Highway Traffic Safety Administration, Romano et al. summarized 11 studies, representing 7 unique data sources permitting the examination of impaired driving by race/ethnicity. As expected, the rates of self-reported DUI were lower for blacks and Hispanics relative to whites [7]. According to the National Epidemiologic Survey on Alcohol and Related Conditions, Native Americans and whites (18 years and older) are at greatest risk for self-reported DUI compared to blacks, Asians, and Hispanics [8]. Similarly, two studies using the National Survey on Drug Use and Health found higher rates of self-reported DUI among whites, with blacks consistently reporting the lowest rates [9,10]. In a trauma center sample, blacks reported lower rates of drinking and driving when compared with whites [11]. Native Americans and Hispanics showed higher rates of drinking among those fatally injured in motor vehicle crashes [12].

Although studies have shown consistent findings for differences in DUI by race/ethnicity, prior studies are limited for a number of reasons. First, the majority of the studies examining impaired driving across race/ethnicity are cross-sectional. Recently, Maldonado-Molina et al. (2011) conducted the first longitudinal study to investigate the effects of risk factors during adolescence on the initiation of DUI among Hispanic young adults [13]. Second, most studies do not account for many known differences in risk factors among race/ethnicities, including drinking trajectories [14], intensity of drinking [15], socioeconomic status [16], risk-taking propensity [11,17], the role of drinking friends and parents [18], and home access to alcohol [19]. Third, most studies examining the prevalence of self-reported DUI focus on adults, with limited research on the incidence of self-reported DUI during the critical developmental period from adolescence to young adulthood. To address these gaps in the literature, the focus of the current study is to examine the role of contextual domains (i.e., demographic, drinking patterns, risk-taking, and social context) in early adolescence for DUI that occurs in early adulthood by race/ethnicity using a nationally representative and longitudinal sample of youth in the United States. We hypothesized that there would be a set of shared and unique risk factors by race/ethnicity.

Methods

Data include in-home, restricted use data from the National Longitudinal Study of Adolescent Health (*Add Health*), one of the largest and most comprehensive school-based surveys of adolescents ever undertaken in the United States [20,21]. *Add Health* is a panel study consisting of four waves of school- and home-based interviews starting in 1994. Parents completed interviews at Wave 1 only. Exposure variables consisted primarily of items from the adolescent in-home interviews from Wave 1 (data from 1994–1995; mean age = 15.6, range = 11–21, SD = 1.7). Self-reported DUI was assessed at Wave 3 (data from 2001–2002, mean age = 21.6, range = 18–27, SD = 1.6). For this study, we excluded participants with (1) missing weights at Wave III ($n = 9,946$) as recommended [22]; and (2) those who

had already initiated DUI at age 15 ($n = 510$) so as to include only incident DUI. The final analytic data set included 10,271 adolescents followed from Wave 1 to Wave 3.

The outcome is self-reported DUI at age 21. Only participants reporting alcohol use at Wave 3 were asked, "Since June 1995, have you driven while drunk?" Alcohol use was assessed with the item "Since June 1995, have you had a drink of beer, wine, or a liquor more than two or three times? Do not include sips or tastes from someone else's drink." No alcohol use was coded as "No DUI." The primary independent variable is race/ethnicity categorized into five groups—Black, Hispanic, White, Asian, and Other—using the original categories of "White," "Black or African-American," "American Indian or Native American," and "Asian or Pacific Islander." "Are you of Hispanic or Latino background?" was asked to determine ethnicity.

We grouped covariates into four contextual domains: (1) Demographics (age, gender, household income, religion); (2) Drinking Patterns (DUI at Wave 2, drink frequency, heavy episodic drinking); (3) Risk-Taking (tobacco and marijuana use, risk-taking, unruly public behavior, driving a car without the owner's permission); and (4) Social Context (access to alcohol in the home, heavy episodic parental drinking, family structure, peer alcohol use, and car ownership).

Demographics

Age was calculated using the month, year of birth, and the 15th of the month for anonymity. Quartiles of annual household income came from parents' self-reported total household income (before taxes; inclusive of welfare benefits, dividends, and all other sources). Using complete data at Wave 1, we imputed missing values of parental income using conditional median value imputation for subgroups based on the method of Blum (2000) [16,23]. Thus, the analytic dataset contained 1,709 imputed values of parental income. We categorized participants' religion as Protestant, Catholic, and Other from the item "What is your religion?" *Add Health* provides 30 categories of religion identifying Protestant groups in the codebook.

Drinking patterns

Self-reported drinking frequency was assessed using the item "During the past 12 months, on how many days did you drink alcohol?" These Likert-type responses ranged from "Never" to "Every day or almost every day". Participants reported the number of drinks typical for an episode over the previous 12 months [range: 1 to >90 drinks]. We constructed frequency of drinks per month to align with the clinical algorithm suggested by NIAAA by using the equation: ((# of drink days per year)*(# of drinks per episode))/12. Heavy episodic drinking was assessed using the item "Over the past 12 months, on how many days did you drink five or more drinks in a row?" This item ranged from "Never" to "Every day or almost every day"; categorized as "Never," "One episode," and "More than one episode".

Risk-taking

For tobacco and marijuana use, participants were asked "Have you ever tried cigarette smoking, even just 1 or 2 puffs?" and "During your life, how many times have you used marijuana?" We categorized both to "Ever used" and "No use." Participants' perception of their willingness to take risks came from the item

Table 1

Characteristics (weighted) of adolescents reporting driving under the influence (DUI) of alcohol as young adults, National Longitudinal Study of Adolescent Health (Add Health)

| | DUI | | No DUI | | ALL | |
|--|-------|------|--------|------|-------|------|
| | n | % | n | % | N | % |
| Demographic | | | | | | |
| Race/Ethnicity | | | | | | |
| Asian | 92 | 2.2 | 595 | 4.0 | 687 | 3.6 |
| Black | 256 | 7.5 | 1,951 | 18.5 | 2,207 | 15.9 |
| Hispanic | 276 | 9.3 | 1,385 | 12.9 | 1,661 | 12 |
| Other/Unknown | 31 | 1.3 | 107 | 1.3 | 138 | 1.3 |
| White | 1,526 | 79.8 | 4,052 | 63.3 | 5,578 | 67.2 |
| Gender | | | | | | |
| Female | 823 | 36.1 | 4,695 | 55 | 5,518 | 50.5 |
| Male | 1,358 | 63.9 | 3,395 | 45.0 | 4,753 | 49.5 |
| Income | | | | | | |
| <\$23K | 354 | 16.9 | 2,034 | 28.3 | 2,388 | 25.6 |
| \$23K–\$39K | 424 | 20.5 | 1,667 | 21.7 | 2,091 | 21.4 |
| \$40K–\$50K | 559 | 25.5 | 2,093 | 25.5 | 2,652 | 25.5 |
| >\$50K | 719 | 37.1 | 1,856 | 24.5 | 2,575 | 27.5 |
| Religion | | | | | | |
| Protestant | 1,141 | 53.4 | 4,680 | 58.2 | 5,821 | 57.1 |
| Catholic | 663 | 29.5 | 1,996 | 22.8 | 2,659 | 24.4 |
| Other | 377 | 17.0 | 1,414 | 18.9 | 1,791 | 18.5 |
| Drinking patterns | | | | | | |
| DUI age 16 | | | | | | |
| Yes | 196 | 8.2 | 165 | 2 | 361 | 3.4 |
| No | 1,984 | 91.8 | 7,921 | 98 | 9,905 | 96.6 |
| Drinks/month | | | | | | |
| 1 | 263 | 12.1 | 770 | 9.3 | 1,033 | 9.9 |
| 2–4 | 349 | 15.7 | 881 | 10.9 | 1,230 | 12 |
| ≥5 | 655 | 29.2 | 1,270 | 15.2 | 1,925 | 18.5 |
| None | 892 | 42.9 | 5,125 | 64.7 | 6,017 | 59.5 |
| Binge episodes/month | | | | | | |
| 1 | 474 | 21.3 | 897 | 10.9 | 1,371 | 13.3 |
| ≥2 | 256 | 11.2 | 489 | 5.9 | 745 | 7.2 |
| None | 1,451 | 67.4 | 6,704 | 83.2 | 8,155 | 79.5 |
| Risk-taking | | | | | | |
| Ever smoked cigarettes | | | | | | |
| No | 724 | 33.9 | 4,039 | 48.8 | 4,763 | 45.2 |
| Yes | 1,448 | 66.1 | 3,997 | 51.2 | 5,445 | 54.8 |
| Ever used marijuana | | | | | | |
| No | 1,438 | 67.8 | 6,445 | 80.3 | 7,883 | 77.3 |
| Yes | 743 | 32.2 | 1,645 | 19.7 | 2,388 | 22.7 |
| Like to take risks | | | | | | |
| Strongly agree | 505 | 25.4 | 1,341 | 17 | 1,846 | 19 |
| Agree | 931 | 40.8 | 2,900 | 36.5 | 3,831 | 37.5 |
| Neutral | 469 | 22.5 | 2,125 | 24.8 | 2,594 | 24.2 |
| Disagree | 255 | 10.3 | 1,444 | 17.9 | 1,699 | 16.1 |
| Strongly disagree | 21 | 1 | 280 | 3.8 | 301 | 3.1 |
| Times unruly in public | | | | | | |
| ≥1time | 1,282 | 57.5 | 3,562 | 44.1 | 4,844 | 47.3 |
| Never | 891 | 42.5 | 4,463 | 55.9 | 5,354 | 52.7 |
| Times driven car w/o owner permission | | | | | | |
| ≥1time | 302 | 13.7 | 665 | 7.5 | 967 | 9 |
| Never | 1,872 | 86.3 | 7,370 | 92.5 | 9,242 | 91 |
| Social context | | | | | | |
| Perceived easy access in home | | | | | | |
| Easy | 824 | 38.1 | 2,146 | 25.8 | 2,970 | 28.7 |
| Hard | 1,357 | 61.9 | 5,944 | 74.2 | 7,301 | 71.3 |
| Parent binge drinks | | | | | | |
| ≥1 past month | 293 | 15.7 | 843 | 13.3 | 1,136 | 13.8 |
| None | 1,670 | 84.3 | 6,280 | 86.7 | 7,950 | 86.2 |
| Single-parent home | | | | | | |
| One-parent | 1,223 | 57.6 | 4,095 | 52.7 | 5,318 | 53.9 |
| Two-parent | 958 | 42.4 | 3,995 | 47.3 | 4,953 | 46.1 |
| # best friends who drink | | | | | | |
| ≥1 | 1,340 | 59.5 | 3,788 | 47 | 5,128 | 50 |
| None | 811 | 40.5 | 4,124 | 53 | 4,935 | 50 |
| Own a car | | | | | | |
| No | 457 | 20.4 | 2,413 | 30.9 | 2,870 | 28.4 |
| Yes | 1,720 | 79.6 | 5,652 | 69.1 | 7,372 | 71.6 |

“You like to take risks” with options ranging from “Strongly agree” to “Strongly disagree.” The number of episodes of unruly public behavior and driving a car without the owner’s permission came from the questions: “In the past 12 months, how often were you loud, rowdy, or unruly in a public place?” and “In the past 12 months, how often did you drive a car without its owner’s permission?” respectively. We dichotomized both items to “Never” and “One or more times.”

Social context

Respondents’ perceived access to alcohol in the home was assessed using the yes/no item “Is alcohol easily available to you in your home?” Parents self-reported binge drinking by answering: “How often in the last month have you had five or more drinks on one occasion?” This was dichotomized to “Never” and “One or more times.” A “Two-parent household” was coded if the parent completing the survey indicated that the other biological parent lived in the house; a “One-parent household” otherwise. Peer alcohol use came from the item: “Of your three best friends, how many drink alcohol at least once a month?” We dichotomized to “None” and “One or more.” Participants answered “Do you own a car, truck, van, or motorcycle?” (at Wave 3).

The analytic design is a two-stage endogenous lagged panel. It is endogenous because we included a prior instance of the outcome (DUI) as an independent variable. To calculate distributions, odds ratios and 95% confidence intervals with robust standard errors, we used weighted survey logistic regression to account for the clustered dual-stage sampling design and the unequal probability of selection of each primary sampling unit [22]. To examine models fit after entering covariates by domains, we examined the Wald Chi-Square statistic [16]. We used SAS version 9.2 for all analyses [24].

Results

Table 1 shows weighted descriptive statistics for the variables included in this study. For young adults who reported DUI, whites, males, and having parent(s) in the highest income group during adolescence were over-represented by nearly 10 percentage points in the DUI group compared to the national distribution (see Table 1). The proportions of young adults reporting DUI at Wave 3 increased with the amount that parents earned when the respondents were adolescents; 37.1% of this group had parents who earned more than \$50,000 per year compared to 16.9% with parents in the less than \$23,000 per year category. The majority (57.1%) of young adults reporting DUI were averaging at least one drink per month when they were 15 years old compared to 35.4% of the non-DUI group. Among all adolescent drinkers, 18.5% consumed an average of five or more drinks per month. By comparison, nearly one-third of the DUI group reported drinking at this frequency when they were adolescents. Likewise, nearly one-third of the DUI group reported some binge drinking as adolescents compared to 16.8% of the non-DUI group. Young adults currently reporting DUI also indicated a DUI episode at last survey four times as frequently as the non-DUI group (8.2% vs. 2.0%). As adolescents, young adults reporting DUI more frequently reported (1) tobacco and marijuana use; (2) strong agreement with the statement “I like to take risks;” (3) one or more episodes of unruly public behavior; and (4) driving someone’s car without their permission. Nationally, nearly one-third of adolescents perceived easy access to alcohol

in the home. For young adults, parental binge drinking and living in one-parent-households did not appear to differ by DUI status. Approximately 60% of youth who self-reported DUI also had one or more drinking best friend(s). Current car ownership was also higher for those reporting DUI.

Table 2 shows the bivariate association that each variable has with DUI. Unadjusted odds ratios (OR) indicate that being white, male, and identifying as Catholic was associated with DUI. Hispanics, Asians, and blacks were less likely to DUI than whites. All income groups had higher odds of DUI relative to the lowest group, but young adults whose parents earned more than \$50,000 annually when they adolescents were significantly more likely to DUI than any other income level.

Table 2

Unadjusted odds ratios (OR) and 95% confidence intervals (CI) for adolescents reporting driving under the influence (DUI) of alcohol as young adults, National Longitudinal Study of Adolescent Health (Add Health)

| | OR | 95% CI | |
|--|-------------|-------------|--------------|
| Demographic | | | |
| Race/Ethnicity | | | |
| Asian vs. white | .43 | .26 | .71 |
| Black vs. white | .32 | .25 | .42 |
| Hispanic vs. white | .57 | .44 | .74 |
| Other/Unknown vs. white | .77 | .42 | 1.39 |
| Gender | | | |
| Male | 2.17 | 1.92 | 2.44 |
| Income | | | |
| \$23K–\$39K vs. <\$23K | 1.58 | 1.26 | 1.98 |
| \$40K–\$50K vs. <\$23K | 1.68 | 1.37 | 2.06 |
| >\$50K vs. <\$23K | 2.53 | 2.06 | 3.12 |
| Religion | | | |
| Catholic vs. Protestant | 1.41 | 1.17 | 1.70 |
| Other vs. Protestant | .98 | .82 | 1.17 |
| Drinking pattern | | | |
| DUI age 16 | | | |
| Yes vs. No | 4.48 | 3.12 | 6.43 |
| Drinks/month | | | |
| 1 vs. None | 1.97 | 1.57 | 2.48 |
| 2–4 vs. None | 2.18 | 1.76 | 2.70 |
| ≥5 vs. None | 2.89 | 2.45 | 3.41 |
| Binge episodes/month | | | |
| 1 Past month vs. None | 2.42 | 2.03 | 2.89 |
| ≥2 Past month vs. None | 2.33 | 1.88 | 2.89 |
| Risk-taking | | | |
| Ever smoked cigarettes | | | |
| Yes vs. No | 1.86 | 1.62 | 2.13 |
| Ever used marijuana | | | |
| Yes vs. No | 1.94 | 1.68 | 2.24 |
| Like to take risks | | | |
| Strongly Agree vs. Strongly Disagree | 5.53 | 3.04 | 10.05 |
| Agree vs. Strongly Disagree | 4.14 | 2.34 | 7.33 |
| Neutral vs. Strongly Disagree | 3.37 | 1.94 | 5.86 |
| Disagree vs. Strongly Disagree | 2.13 | 1.16 | 3.92 |
| Times unruly in public | | | |
| ≥1 time vs. Never | 1.71 | 1.51 | 1.94 |
| Times driven car w/o owner permission | | | |
| ≥1 time vs. Never | 1.97 | 1.64 | 2.35 |
| Social context | | | |
| Perceived easy access in home | | | |
| Easy access vs. Hard access | 1.77 | 1.54 | 2.05 |
| Parent binge drinks | | | |
| ≥1 Past month vs. None | 1.22 | .99 | 1.50 |
| Single-parent home | | | |
| One-parent vs. Two-parent | 1.22 | 1.07 | 1.39 |
| # best friends who drink | | | |
| ≥1 drink friends vs. No drink friends | 1.66 | 1.44 | 1.91 |
| Own a car | | | |
| Yes vs. No | 1.75 | 1.45 | 2.11 |

Variables significant at the 95% level are **bolded**.

Young adults who reported a DUI when they were adolescents were highly likely to report another DUI several years later. Increasing levels of average monthly drinking frequency tended to increase the odds of DUI, but unadjusted differences between groups were not significant. Binge drinking was a significant risk factor but with no difference between the two levels. All variables in the risk-taking domain, including smoking, marijuana use, unruly public behavior, and driving a car without the owner's permission significantly increased the odds of DUI in the bivariate analysis. Adolescents who strongly agreed with risk-taking were 5.5 times as likely to DUI compared to those who strongly disagreed. In addition, perceived easy access to alcohol in the home, a single-parent home, having one or more best friend(s) who drink, and car ownership were all significantly associated with DUI.

Figure 1 shows the adjusted odds ratios (AORs) and 95% confidence intervals for the final model after adding variables in each contextual domain in a step-wise fashion.

We examined the AORs for race/ethnicity for consistency and significant changes across four models starting with (1) demographics only; (2) demographics and drinking patterns; (3) demographics, drinking patterns, and risk-taking; and (4) demographics, drinking patterns, risk-taking, and social context. In all four models, each group maintained the same rank order (whites, Hispanics, Asians, and blacks), with whites at significantly higher risk. The Wald's Chi-Square score increased after adding each domain indicating improved model fit. In the final step, we stratified by race/ethnicity to examine risk and protective factors.

Table 3 shows stratified results for the full model. We found unique risk factors for whites and blacks but not Hispanics and Asians. For whites, unique risk factors included self-identifying as Catholic (OR: 1.32), driving a car without the owner's permission (OR: 1.76), and agreement with risk-taking (OR: 1.68). For blacks, a unique risk factor was binge drinking (OR: 1.81) whereas neutrality on the question of risk-taking was a uniquely protective factor (OR: .44) for blacks.

We also found multiple shared risk factors in each contextual domain. For each race/ethnicity, being male and current car ownership was significantly associated with the risk of DUI. The intraracial gender differences are worth noting. The disparity for Asian males compared to Asian females (OR: 5.98) and Hispanic males compared to Hispanic females (OR: 3.51) was higher than for the same comparison for whites (OR: 2.08) and blacks (OR: 2.67). For Hispanics and Asians, we found that ever smoking a cigarette was a DUI risk factor, but mean monthly drinking frequency and drinking in adolescence were not. This result stands in contrast to whites and blacks that did share mean monthly drinking frequency as a DUI risk factor. Although prior DUI was one of the strongest predictors of subsequent DUI in our final model, especially for Asians (OR: 10.2), it was not significant for Hispanics. Hispanics shared marijuana use and unruly public behavior as risk factors with blacks and whites, respectively. In the social context domain, perceived easy home-access to alcohol emerged as a significant and consistent risk factor for whites (OR: 1.25), Hispanics (OR: 2.02), and Asians (OR: 1.90). Figure 2 visualizes select shared and unique risk factors, by race, along with the magnitude of the adjusted odds ratios derived from the final model.

Discussion

Using a longitudinal and nationally representative sample of racially diverse adolescents, we examined the risk and protective

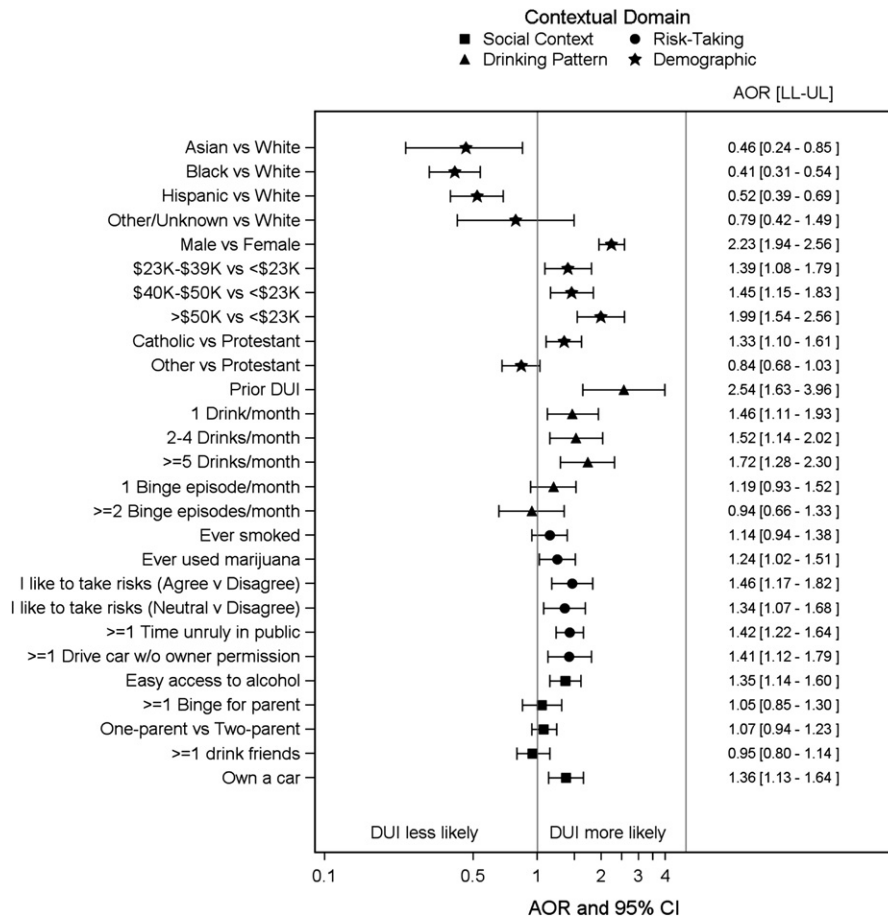


Figure 1. Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI)* for Adolescents Reporting Driving while Under the Influence (DUI) as Young Adults, National Longitudinal Study of Adolescent Health (*Add Health*). * Final model after step-wise addition of contextual domains. LL = lower limit, UL = upper limit. Unless otherwise noted, the reference category is “None” or “No.”

factors operating in early adolescence for self-reported DUI during young adulthood. After accounting for differences in socio-demographics, drinking behaviors, personal risk-taking, and social context, race/ethnicity still plays an important role in DUI. Whites and blacks appear to have a unique set of DUI risk factors, and perception of easy access to alcohol in the home was common to whites, Hispanics, and Asians. As expected, white youth are at the highest risk of DUI in young adulthood. In our study, whites were 50% more likely to self-report DUI than blacks, Hispanics, or Asians. Black adolescents appear the least likely to DUI as young adults.

Our results are consistent with many national surveys. Specifically, on the (1) prevalence of DUI among 10th grade adolescents and 16-to-20-year-olds; and the (2) higher relative risk of DUI among 18-to-24-year-old whites in the general and university populations. [25–28]

Interesting differences in DUI predictors emerged across race/ethnicity. For Hispanics and Asians, monthly drinking frequency and binge drinking in early adolescence were not associated with future DUI in contrast to whites and blacks. Also, we did not find any uniquely associated risk or protective factors in adolescence for young adult DUI in these two groups but rather several shared risk factors. For Hispanics, risk factors included delinquency and having ever smoked cigarettes. For whites, agreeing that “I like to

take risks,” driving a car without the owner’s permission, and self-identifying as Catholic are uniquely associated with DUI risk.

Adolescence is often characterized by increased risk-taking and new car ownership. [17,29,30] Risk-taking behaviors partially explained the increased risk of car crashes for young males in Australia. [31] Our findings suggest that engaging in risk-taking behaviors increased risk for DUI among whites, but results were inconsistent for non-whites. Similarly, Cherpitel (1999) reported that risk-taking dispositions were significant predictors of emergency-room-treated injuries for whites (>18 years old) but not for blacks or Hispanics. [17] In addition, car ownership as a young adult was a significant DUI risk factor. *Add Health* does not assess car ownership in adolescence, although it is thought to be relatively high (>75%) among teenagers from high-income families [30]. Our results suggest higher DUI risk among adolescents from wealthier families, but a recent Finnish study of youth suspected of drunk driving found an indirect association [32]. Future research can provide a more nuanced understanding of DUI-risk for adolescents with access to cars at varying levels of parental income.

In addition, perception of easy home access to alcohol had a strong association with DUI for whites, Hispanics, and Asians. Prior research has shown that the parental provision of alcohol in the home is the primary source for 11-year-olds, while peers

Table 3

Adjusted odds ratios (AOR) and 95% confidence intervals (CI) for adolescents reporting driving while under the influence (DUI) as young adults stratified by race/ethnicity, National Longitudinal Study of Adolescent Health (Add Health)

| | White | | Black | | Hispanic | | Asian | | | | | |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|--------------|-------------|--------------|
| | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI |
| Demographic | | | | | | | | | | | | |
| Gender | | | | | | | | | | | | |
| Male | 2.11 | 1.77 | 2.51 | 2.69 | 1.70 | 4.24 | 3.51 | 2.12 | 5.8 | 5.98 | 2.54 | 14.10 |
| Income | | | | | | | | | | | | |
| \$23K–\$39K vs. <\$23K | 1.48 | 1.08 | 2.02 | 1.25 | .71 | 2.19 | 1.30 | .71 | 2.39 | .91 | .25 | 3.26 |
| \$40K–\$50K vs. <\$23K | 1.66 | 1.27 | 2.17 | 1.47 | .72 | 3.01 | .51 | .21 | 1.25 | .71 | .12 | 4.34 |
| >\$50K vs. <\$23K | 2.24 | 1.62 | 3.10 | 2.3 | 1.20 | 4.39 | 1.03 | .50 | 2.10 | 1.08 | .23 | 5.15 |
| Religion | | | | | | | | | | | | |
| Catholic vs. Protestant | 1.25 | 1.02 | 1.52 | .99 | .37 | 2.64 | 1.50 | .89 | 2.52 | 2.94 | .89 | 9.68 |
| Other vs. Protestant | .81 | .62 | 1.04 | 1.17 | .70 | 1.95 | 1.44 | .75 | 2.78 | 1.55 | .44 | 5.46 |
| Drinking pattern | | | | | | | | | | | | |
| DUI age 16 | | | | | | | | | | | | |
| Yes vs. No | 2.52 | 1.50 | 4.23 | 4.97 | 1.51 | 16.40 | 1.93 | .76 | 4.91 | 10.20 | 7.14 | 14.60 |
| Drinks/month | | | | | | | | | | | | |
| 1 vs. None | 1.39 | 1.01 | 1.91 | 1.98 | .81 | 4.81 | 1.55 | .68 | 3.54 | .63 | .10 | 4.12 |
| 2–4 vs. None | 1.72 | 1.25 | 2.37 | 2.06 | 1.06 | 3.99 | .82 | .35 | 1.90 | 1.01 | .25 | 4.02 |
| ≥5 vs. None | 1.73 | 1.23 | 2.43 | 2.72 | 1.35 | 5.49 | 1.53 | .60 | 3.87 | 2.37 | .27 | 21.10 |
| Binge episodes/ month | | | | | | | | | | | | |
| 1 vs. None | 1.23 | .91 | 1.67 | 1.90 | 1.07 | 3.38 | 1.15 | .60 | 2.18 | .71 | .10 | 5.05 |
| ≥2 vs. None | 1.05 | .69 | 1.61 | 1.10 | .52 | 2.31 | .77 | .29 | 2.05 | .19 | .02 | 2.35 |
| Risk-taking | | | | | | | | | | | | |
| Ever smoked cigarettes | | | | | | | | | | | | |
| Yes vs. No | 1.17 | .94 | 1.46 | .58 | .33 | 1.02 | 1.69 | 1.08 | 2.65 | 4.08 | 1.72 | 9.70 |
| Ever used marijuana | | | | | | | | | | | | |
| Yes vs. No | 1.11 | .87 | 1.40 | 1.96 | .97 | 3.98 | 1.73 | .97 | 3.09 | 1.86 | .67 | 5.20 |
| Like to take risks | | | | | | | | | | | | |
| Agree vs. Disagree | 1.67 | 1.34 | 2.08 | .64 | .37 | 1.11 | 1.13 | .63 | 2.04 | 2.26 | .45 | 11.50 |
| Neutral vs. Disagree | 1.57 | 1.23 | 2.01 | .44 | .26 | .75 | 1.11 | .57 | 2.17 | 2.21 | .37 | 13.10 |
| Times unruly in public | | | | | | | | | | | | |
| ≥1 time vs. Never | 1.37 | 1.14 | 1.63 | 1.22 | .79 | 1.88 | 1.81 | 1.18 | 2.78 | .85 | .41 | 1.78 |
| Times driven car w/o owner permission | | | | | | | | | | | | |
| ≥1 time vs. Never | 1.72 | 1.24 | 2.37 | 1.33 | .77 | 2.31 | .49 | .22 | 1.10 | .42 | .04 | 4.13 |
| Social context | | | | | | | | | | | | |
| Perceived easy access in home | | | | | | | | | | | | |
| Easy vs. Hard | 1.25 | 1.04 | 1.49 | 1.10 | .55 | 2.20 | 2.02 | 1.29 | 3.16 | 1.90 | 1.13 | 3.22 |
| Parent binge drinks | | | | | | | | | | | | |
| ≥1 vs. None | 1.09 | .87 | 1.38 | .90 | .42 | 1.90 | 1.15 | .56 | 2.36 | 1.35 | .55 | 3.33 |
| Single-parent home | | | | | | | | | | | | |
| One-parent vs. Two-parent | .96 | .80 | 1.15 | .99 | .56 | 1.73 | 1.02 | .63 | 1.66 | .51 | .12 | 2.17 |
| # best friends who drink | | | | | | | | | | | | |
| ≥1 vs. None | 1.08 | .89 | 1.31 | .94 | .55 | 1.61 | 1 | .63 | 1.61 | 1.71 | .70 | 4.15 |
| Own a car | | | | | | | | | | | | |
| Yes vs. No | 1.29 | 1.05 | 1.60 | 1.55 | 1.10 | 2.17 | 1.96 | 1.04 | 3.67 | 3.99 | 1.13 | 14 |

Variables significant at the 95% level are **bolded**.

become more prominent a few years later [19]. In 2010, among current drinkers aged 12 to 20 years old, 21.6% reported that they obtained their last use of alcohol in the past month from a parent, guardian, or other adult family member [2]. Therefore, the household environment, such as parental alcohol use, plays a key independent role in shaping adolescent drinking behaviors. In a previous study, adolescents with parents who drink [18] or whose parents DUI are also more likely to DUI [33–36]. Our study suggests that perceived home access to alcohol is a strong predictor of DUI for all race/ethnicities, except for blacks. Future studies should examine perceived ease of home access and binge drinking behaviors, in addition to the age and drinking frequency-based screening tools identified by NIAAA. A developmentally and clinically appropriate alcohol screening can include perceived ease of alcohol access, in addition to frequency and intensity (binge) of drinking behaviors. As a result, such a screening tool may help identify youth at most risk of alcohol-related injuries and harm.

Several limitations in this study are noteworthy. First, we rely on self-assessments of “drunkenness,” which can vary by race/ethnicity. For example, Hispanics may overestimate the number of drinks needed to get drunk and might underreport DUI [37]. Second, we do not know how often or when exactly DUI occurred for the five-year period between Wave II and III. Third, we homogenized each race/ethnicity group. Prior research indicates that certain racial/ethnic subgroups, such as acculturated Latino immigrants, are at higher risk of DUI [13]. Small-sample-size considerations prevented us from examining such subgroups as well as gender. Our previous research work suggests that risk and protective factors for DUI are similar for boys and girls at this age [18]. Finally, because our study does not assess DUI beyond age 21, we could not examine whether DUI risk has a delayed peak for binge-drinking blacks [7,14].

Our study has several strengths. First, we used a longitudinal, nationally representative sample of adolescents in the United States, which permits the investigation of several risk and

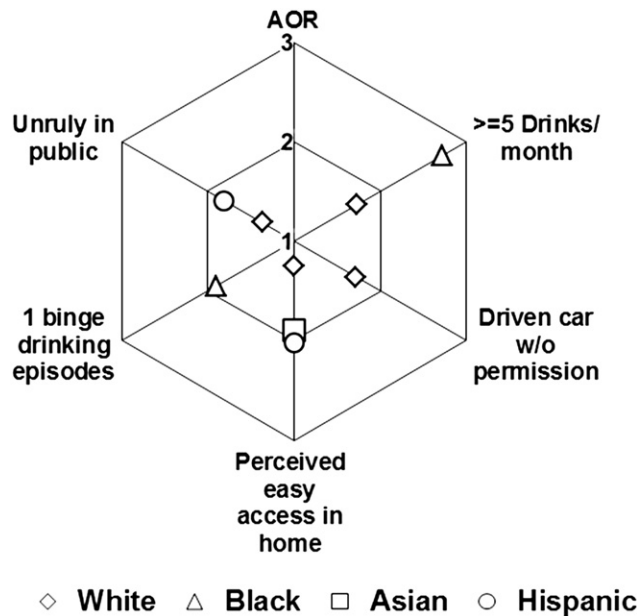


Figure 2. Diagram of Select Unique and Shared Risk Factors for Adolescents Driving while Under the Influence as Young Adults, National Longitudinal Study of Adolescent Health (*Add Health*). Stratified and adjusted odds ratios (AOR) are depicted as symbols corresponding to the estimated AOR and a category of race/ethnicity. Multiple symbols on a single variable axis indicate a shared risk factor.

protective factors by race/ethnicity over time. Second, we adopted a graduated quantity–frequency approach to capture more precise patterns and volume of alcohol consumption [17,38]. Our measures were consistent with recent guidelines for rapid assessments of problematic drinking released by the NIAAA [6]. Third, we examined the role of several contextual domains on self-reported DUI. For instance, many studies include seatbelt-use as a proxy measure for risk-taking personality types [13,18]; we included a more direct measure. This study also included parental income as a measure of socioeconomic status, instead of parental education as a proxy, as well as many individual, parental, peer factors related to DUI behaviors.

Race/ethnicity is a persistent risk factor for DUI among young adults. We identified several unique and shared modifiable risk factors present during this critical time of development. Perception of easy home access to alcohol increased the risk for future DUI for adolescents of all race/ethnicity groups, except for blacks; while risk-taking attitudes, marijuana use, and religious affiliation were risk factors for whites only. These risk factors can help inform and tailor brief clinical interventions such as national alcohol screening guidelines. Findings suggest that home access to alcohol might have broad adolescent health implications regardless of race/ethnicity.

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