

Age at Drinking Onset and Alcohol Dependence

Age at Onset, Duration, and Severity

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Objective: To examine whether starting to drink at an early age is associated with developing alcohol dependence at a younger age and chronic relapsing dependence, controlling for respondent demographics, smoking and illicit drug use, childhood antisocial behavior and depression, and family alcoholism history.

Design: Cross-sectional survey.

Setting: Nationwide face-to-face survey with a multi-stage probability sample.

Participants: A total of 43 093 adults were surveyed in 2001-2002.

Main Outcome Measures: Based on *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, criteria, lifetime alcohol dependence, dependence within 10 years of starting drinking, multiple episodes, an alcohol dependence episode in the past year, episodes exceeding 1 year, and meeting 6 or 7 dependence criteria.

Results: Relative to respondents who began drinking at 21 years or older, those who began drinking before age 14 years were more likely to experience alcohol dependence ever and within 10 years of first drinking (adjusted hazard ratios and 95% confidence intervals [CIs], 1.78 [1.51-2.11] and 1.69 [1.38-2.07], respectively). They also more often experienced past-year dependence and multiple dependence episodes (adjusted odds ratios, 1.93 [95% CI, 1.40-2.64] and 3.09 [95% CI, 2.19-4.35], respectively). Among alcohol-dependent persons, the odds were 2.62 (95% CI, 1.79-3.84) for having at least 1 episode exceeding 1 year and 2.89 (95% CI, 1.97-4.23) for meeting 6 or 7 dependence diagnostic criteria.

Conclusion: There is a need to screen and counsel adolescents about alcohol use and to implement policies and programs that delay alcohol consumption.

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MORE THAN 75 000 DEATHS annually are attributable to excessive alcohol consumption, the third leading preventable cause of death in the United States.¹ Unhealthy alcohol use is found in 7% to 20% of outpatients, 30% to 40% of emergency department patients, and 50% of trauma patients.²

The Centers for Disease Control and Prevention's 2003 Youth Risk Behavior Survey of high school students nationwide revealed that 28% drank alcohol other than a few sips before age 13 years.³ By age 17 years they were 7 times more likely to consume 5 or more drinks 6 or more times per month than those who waited until they were 17 years or older to begin drinking. The National Institute on Alcohol Abuse and Alcoholism has defined binge drinking as males consuming 5 or more and females 4 or more drinks in 2 hours.⁴ Binge

drinking for the average person on an empty stomach produces a blood alcohol level of 0.08% or higher, the legal level of intoxication in every state.⁵ Thus, those who begin drinking before age 13 years are much more likely even in high school to frequently drink to intoxication. Compared with other students, the approximately 1 million frequent heavy drinkers more often exhibit behaviors that pose risk to themselves and others, such as riding with drinking drivers; driving after drinking; never wearing safety belts; carrying guns and other weapons; becoming injured in fights and suicide attempts; having unplanned and unprotected sex; becoming or making someone else pregnant; using tobacco, marijuana, and other illicit drugs; drinking and smoking marijuana at school; and earning mostly low grades (*D*'s and *F*'s) in school.⁴

Starting to drink at an early age is also associated with alcohol dependence and related problems during adult life. Accord-

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ing to analyses of the National Longitudinal Alcohol Epidemiologic Study (NLAES), a national survey of adults 18 years and older conducted in 1991-1992 (N=42 682; response rate, 90%), among persons who began drinking before age 14 years, 45% developed *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*, diagnosable dependence compared with 10% of persons who waited until they were 21 years or older.⁶ Those relations persisted after controlling analytically for family history of alcoholism, age, sex, race/ethnicity,⁷ history of cigarette and other drug use, education, and marital status.⁸

Early drinking onset has also been linked, after episodes of drinking among both adolescents and adults, to unintentional injuries, motor vehicle crashes, physical fights, unplanned and unprotected sex,⁸⁻¹² nicotine dependence, illicit substance use, antisocial personality, conduct disorder, and academic underachievement.¹³ Not all alcohol-dependent persons remain dependent throughout their lives. In the NLAES, whereas 12% experienced alcohol dependence at some point, 4% did so during the year preceding the survey.⁶

Unexplored has been whether starting to drink at a younger age is associated with developing dependence at a younger age and chronic relapsing dependence, characterized by multiple episodes, past-year dependence among adults of all ages, and among alcohol-dependent individuals, episodes of longer duration and a wider range of symptoms. This study examines these questions in a more recent national survey.

METHODS

In 2001-2002, the National Institute on Alcohol Abuse and Alcoholism conducted the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).¹⁴ Under contract, the US Census Bureau, supervised by the National Institute on Alcohol Abuse and Alcoholism, conducted face-to-face interviews with a multistage probability sample of 43 093 adults 18 years and older (response rate, 81%). The survey methods and other quality control procedures and test-retest reliability tests have been detailed by Grant et al.¹⁴ The research protocol, including informed consent procedures, received full ethical review and approval from the US Census Bureau and the Office of Management and Budget.

DIAGNOSTIC ASSESSMENT

The NESARC used the National Institute on Alcohol Abuse and Alcoholism's Alcohol Use Disorder and Associated Disabilities Interview Schedule *DSM-IV* version (AUDADIS-IV), a state-of-the-art structured diagnostic interview designed for use by non-clinician lay interviewers. Computer algorithms were designed to produce diagnoses of abuse and dependence consistent with the final *DSM-IV* criteria. Numerous national and international psychometric studies¹⁴⁻²⁵ have documented good to excellent reliability and validity of the AUDADIS-IV alcohol abuse and dependence criteria, including clinical reappraisals conducted by psychiatrists in clinical and general population samples.

On the basis of *DSM-IV* variables, lifetime and past-year alcohol dependence in the NESARC were defined by 7 diagnostic criteria: tolerance; the withdrawal syndrome or drinking to relieve or avoid withdrawal symptoms; drinking larger amounts or for a longer period than intended; persistent desire or unsuccessful attempts to cut down on drinking; spending a great

deal of time obtaining alcohol, drinking, or recovering from effects of drinking; giving up important social, occupational, or recreational activities in favor of drinking; and continued drinking despite physical or psychological problems caused by drinking. Diagnosis of a 12-month alcohol dependence required that respondents satisfy 3 of the 7 *DSM-IV* criteria for dependence in the past year or during any year before the past year. Diagnosis of dependence before the past year also required clustering, as specified in the *DSM-IV*, of at least 3 dependence criteria in any 1 year of the respondent's life. Lifetime diagnosis includes all respondents who were dependent in the past year or before the past year. Alcohol dependence withdrawal criteria required at least 2 positive symptoms of withdrawal as defined by *DSM-IV* alcohol withdrawal diagnosis.

Duration criteria associated with dependence criteria in the NESARC define the repetitiveness with which these diagnostic criteria must occur to be positive. They were operationalized by means of qualifiers such as "recurrent," "often," and "persistent" and were embedded directly in the symptom questions. Several dependence-related outcomes were examined: lifetime dependence; dependence within 10 years of drinking onset, before age 25 years, and in the past year; experiencing 2 or more dependence episodes; episodes exceeding 1 year; and meeting 6 or 7 dependence symptom criteria.

Persons who met dependence criteria were asked how old they were the first time some of these experiences began to happen around the same time. We examined the incidence of dependence by years after drinking onset (for lifetime dependence and dependence within 10 years of drinking onset) and by chronological age (for dependence before age 25 years).

To determine the number of episodes, respondents who ever experienced dependence were asked, "In your entire life, how many separate periods like this did you have when some of these experiences were happening around the same time? By separate periods, I mean times that were separated by at least 1 year when you either stopped drinking entirely or you did not have any of the experiences you mentioned with alcohol at all." Duration of longest dependence was ascertained by asking diagnosed persons the longest period they had when some of these experiences were happening around the same time. Persons with lifetime and past-year dependence were stratified into those who met 6 or 7 vs 3 to 5 of the dependence diagnostic criteria.

Respondents were asked the age at which they first started drinking, not counting tastes or sips, which was categorized as younger than 14 years, separately for each year from 14 through 20 years old, and 21 years and older (the minimum legal drinking age in the United States). Family history of alcohol problems was positive if first-degree relatives (mother, father, sister, brother, son, or daughter) had an alcohol problem. Antisocial behavior was positive if respondents reported 3 or more antisocial behaviors before age 15 years, and depression was based on meeting *DSM-IV* criteria before age 14 years. The *DSM-IV* criteria for dysthymia and generalized anxiety were also examined. Test-retest reliability of AUDADIS-IV measures for depression, dysthymia, and antisocial behaviors were good ($\kappa=0.65$, 0.58, and 0.67, respectively; mean $\kappa=0.64$).²⁴

Respondents were asked if they had ever and in the past year used 1 of 10 types of drugs: sedatives, tranquilizers, pain killers, stimulants, marijuana, cocaine, hallucinogens, inhalants, heroin, and other medicines. Persons who had ever smoked 100 cigarettes were considered cigarette users.

DATA ANALYSIS

A software program (SUDAAN version 8.1; Research Triangle Institute, Research Triangle Park, NC) was used that applies Taylor series linearization to adjust for the complex survey

Table. Dependence and, Among Dependents, Duration of Longest Dependence Episode and Number of Dependence Symptoms According to Age Started Drinking: National Epidemiologic Survey on Alcohol and Related Conditions*

| Age Started Drinking, y | Ever Drank, No. (%) (N = 26 829) | Dependence, % | | | | | | Among Persons Ever Alcohol Dependent, % | | | |
|-------------------------|-------------------------------------|---------------|-----------|--------------|------------------|-----------|-------------|---|-------|-----|-------------------------|
| | | Never | Lifetime† | Within 10 y† | Before Age 25 y† | Past Year | ≥2 Episodes | Duration of Longest Episode, mo | | | 6-7 Dependence Symptoms |
| | | | | | | | | <13 | 13-24 | ≥25 | |
| <14 | 1380 (5) | 53 | 47 | 27 | 33 | 13 | 15 | 42 | 17 | 41 | 54 |
| 14 | 956 (4) | 55 | 45 | 28 | 31 | 12 | 11 | 50 | 11 | 38 | 50 |
| 15 | 1516 (6) | 62 | 38 | 26 | 27 | 10 | 9 | 53 | 13 | 34 | 41 |
| 16 | 2925 (11) | 68 | 32 | 21 | 22 | 10 | 8 | 55 | 12 | 33 | 30 |
| 17 | 2761 (10) | 72 | 28 | 19 | 19 | 8 | 7 | 60 | 12 | 28 | 30 |
| 18 | 5834 (22) | 85 | 15 | 10 | 10 | 4 | 3 | 57 | 12 | 31 | 23 |
| 19 | 2063 (8) | 83 | 17 | 10 | 11 | 4 | 5 | 54 | 15 | 31 | 33 |
| 20 | 1978 (7) | 89 | 11 | 6 | 6 | 3 | 3 | 68 | 6 | 26 | 24 |
| ≥21 | 7416 (28) | 91 | 9 | 4 | 2 | 2 | 2 | 61 | 12 | 27 | 24 |

* $P < .001$ for all. P values refer to bivariate relationships between age started drinking and alcohol dependence outcomes tested using χ^2 analysis.
 †From Kaplan-Meier survival analysis.

sample design to estimate prevalence and standard errors for prevalence as well as odds ratios and 95% confidence intervals (CIs) using logistic regression. To be consistent with previous NLAES age at drinking onset analyses,⁶⁻⁹ analyses focused only on respondents who drank 12 or more drinks in at least 1 year of their life. We used χ^2 analyses to test the significance of relationships among age at drinking onset, background characteristics, and the various dependence outcomes.

Kaplan-Meier survival curves were calculated to describe the prevalence of alcohol dependence as a function of years since drinking onset, by age at drinking onset. Because of the cross-sectional nature of the NESARC sample, older respondents have longer follow-up after drinking onset and greater opportunity to develop dependence; survival data methods appropriately account for available follow-up, treating those without a history of dependence as censored at age of follow-up. Hazard ratios and 95% CIs from Cox proportional hazards multiple regression models assessed the increased risk of dependence for those with younger age at onset vs those with onset at 21 years or older (the reference group), controlling for demographic and other factors known to be related to age at drinking onset (expression of antisocial behaviors before age 15 years,¹³ major depression before age 14 years,²⁶ and family history of alcohol dependence). Survival methods were also used to analyze dependence within 10 years of onset (censoring those who were dependence free 10 years after onset) and dependence before age 25 years (with chronological age at dependence as the outcome).

Controlling for demographic and background characteristics known to be related to age at drinking onset, logistic regression models examined relationships between age at drinking onset and the following outcomes: lifetime dependence, past-year dependence, experiencing 2 or more dependence episodes, and, among ever-dependent respondents, episodes exceeding 1 year and meeting 6 or 7 dependence symptom criteria. Odds ratios and 95% CIs were calculated describing the increased risk of dependence outcomes for those with drinking onset before age 14 years and at each age from 14 through 20 years relative to those who started drinking at or after age 21 years (the reference group).

RESULTS

At some point in their lives, 12.5% of the NESARC sample met DSM-IV alcohol dependence criteria, 19% of ever drinkers, representing more than 26 million Americans. Eight

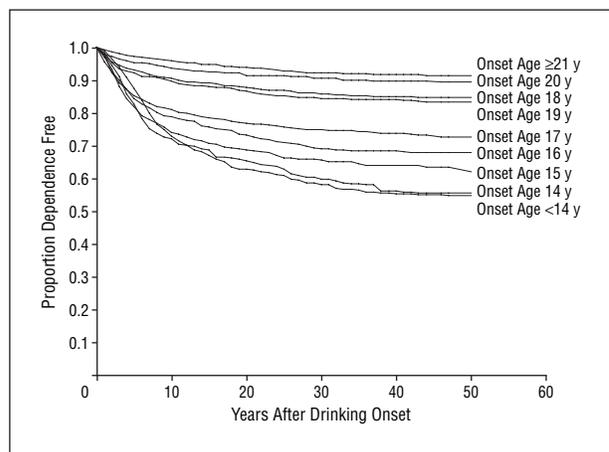


Figure 1. Kaplan-Meier survival curves describing the proportion of dependence-free individuals by age at drinking onset.

percent of the sample met the criteria before age 25 years, representing more than 16 million people. During the survey year, 3.8% of the sample, representing 7.9 million people, met the alcohol dependence criteria, one third of lifetime dependents. Three percent of the sample reported 2 or more episodes.

Among ever drinkers, 14% first became dependent within 10 years of drinking onset, 45% experienced an episode exceeding 1 year, and 33% had at least 6 of 7 potential dependence diagnostic criteria. Nine percent of ever drinkers met antisocial behavior criteria before age 15 years, 2% met depression criteria before age 14 years, and less than 1% met generalized anxiety or dysthymia criteria. The **Table** lists the percentages of ever drinkers who began before age 14 years and at each year from 14 through 21 years and older.

Early age at first drinking was strongly associated with the proportion of respondents who experienced alcohol dependence in their lifetime, within 10 years of drinking onset, before age 25 years, and during the survey year (when the average respondent age was 44 years) and who experienced multiple episodes of dependence (**Figure 1** and

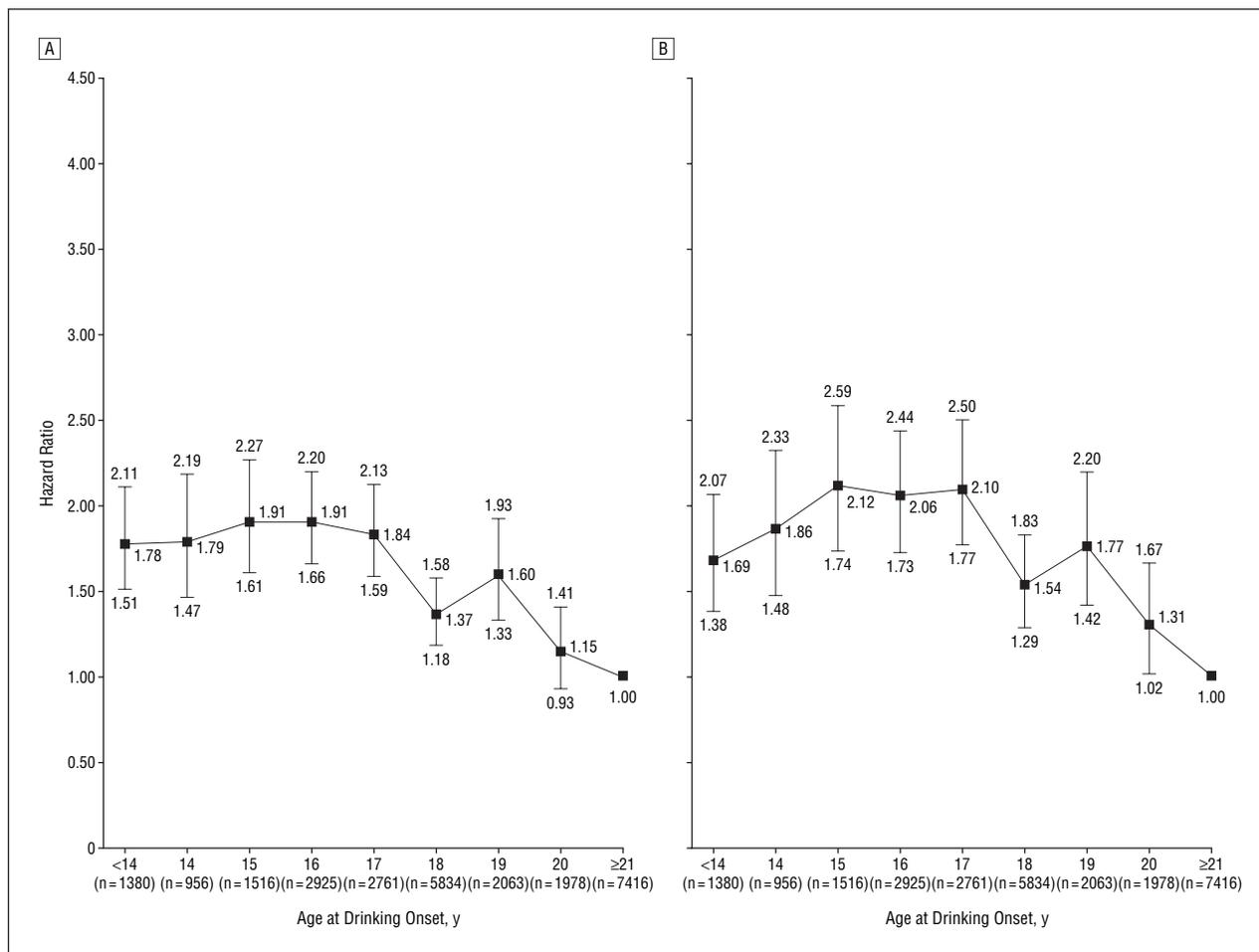


Figure 2. Mean adjusted hazard ratios from Cox proportional hazards multiple regressions for ever alcohol dependent (A) and alcohol dependent within 10 years of drinking onset (B) according to age started drinking. Hazard ratios are relative to those who started drinking at 21 years or older controlling for age, sex, race/ethnicity, highest grade in school, current marital status, former and current smoking, former and current drug use, family history of alcoholism, antisocial behavior before age 15 years, and depression before age 14 years. Error bars represent 95% confidence intervals.

Table). Comparing those who began drinking before age 14 years vs age 21 years or older, 47% vs 9% experienced lifetime dependence, 27% vs 4% within 10 years of onset, and 33% vs 2% before age 25 years (Kaplan-Meier survival estimates). Among persons who started to drink before age 14 years, 13% met the alcohol dependence criteria during the survey year, and 15% experienced 2 or more dependence episodes compared with only 2% of those who waited until they were 21 years or older (Table).

Individuals who began drinking at younger ages were more likely to experience multiple dependence episodes. However, among persons with lifetime dependence, early-onset drinkers were not more likely to experience multiple episodes, but they were more likely to experience episodes of longer duration (Table). Among those who began drinking before age 14 years, 58% experienced an episode lasting more than 1 year compared with 39% of those who waited until they were 21 years or older to begin drinking (Table).

Proportional hazards models and logistic regression analysis revealed that relative to those who waited until age 21 years or older, those who started drinking before age 14 years had elevated hazards of developing lifetime dependence (1.78; 95% CI, 1.51-2.11), dependence within

10 years of drinking onset (1.69; 95% CI, 1.38-2.07) (**Figure 2**), dependence before age 25 years (8.12; 95% CI, 6.33-10.43) (figure available on request), and past-year dependence (1.93; 95% CI, 1.40-2.64) (**Figure 3**) (proportional hazards regressions) and 3.09 (95% CI, 2.19-4.35) times the odds of experiencing 2 or more dependence episodes (logistic regressions) (Figure 3). These relationships held after controlling for age, sex, race/ethnicity, highest grade in school, marital status, former and current smoking, drug use, history of antisocial behavior before age 15 years, major depression before age 14 years, and family history of alcoholism.

Furthermore, among dependent persons relative to those who waited until they were 21 years or older, those who began drinking before age 14 years had 2.62 (95% CI, 1.79-3.84) times the odds of experiencing episodes exceeding 1 year and 2.89 (95% CI, 1.97-4.23) times the odds of experiencing 6 or 7 vs 3 to 5 dependence symptoms after controlling for the aforementioned covariates (**Figure 4**). Usually, each additional year earlier than age 21 years that a respondent began to drink, the greater the odds that he or she would develop the alcohol dependence outcomes examined.

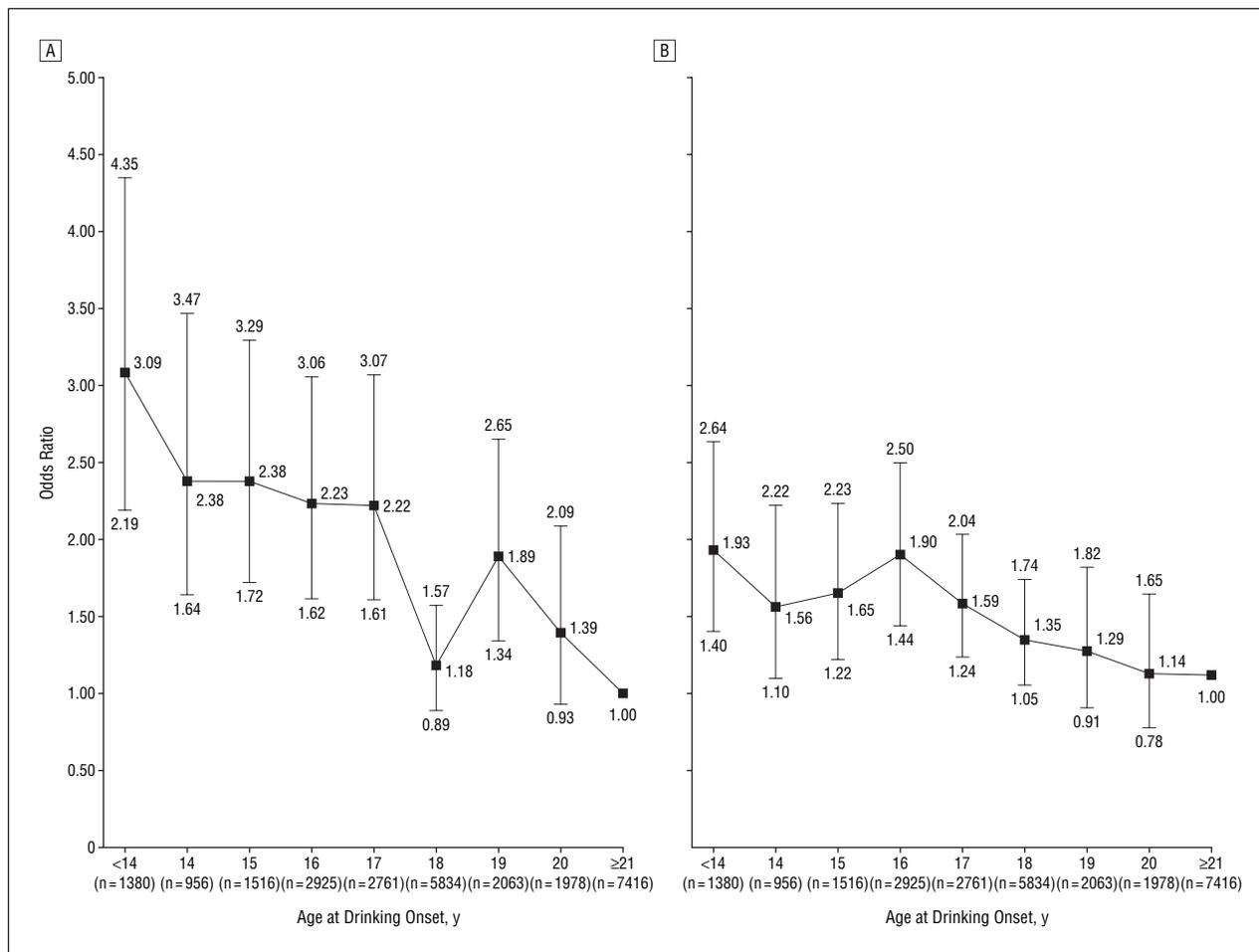


Figure 3. Mean adjusted odds ratios for 2 or more episodes of dependence vs 1 or fewer (A) and for past-year alcohol dependence (B) according to age started drinking. Odds ratios are relative to those who started drinking at 21 years or older controlling for age, sex, race/ethnicity, highest grade in school, current marital status, former and current smoking, former and current drug use, family history of alcoholism, antisocial behavior before age 15 years, and depression before age 14 years. Error bars represent 95% confidence intervals.

COMMENT

This analysis underscores the importance of systematically exploring and counseling adolescent patients about their drinking practices. Because pediatric medical care providers considerably underdiagnose alcohol use, abuse, and dependence among patients aged 14 to 18 years, structured screening devices have been recommended to more accurately identify these conditions.²⁷ Among NESARC respondents, the percentage that experience onset of alcohol dependence peaks at age 18 years and rapidly declines after age 25 years.²⁸ Similar to results from the NLAES collected a decade earlier,⁸ this study found that the younger respondents were when they began drinking, the greater their likelihood of experiencing lifetime alcohol dependence after analytically controlling for family history of alcoholism and numerous behavioral and personality characteristics related to the age at drinking onset. This persistence raises the possibility that this relationship may not be solely a by-product of greater risk-taking behavior among early drinkers reflected by tobacco or drug use or predisposing psychological characteristics or disorders that include childhood antisocial personality or major depression. Nearly half (46%)

of drinkers who developed alcohol dependence began drinking at 16 years or younger, although only one quarter of drinkers started by that age. Other measures of adolescent risk taking not included in the survey could not be assessed as potential confounders.

This study identifies several new findings. First, the younger the age at which people started to drink, the greater their likelihood of developing alcohol dependence within 10 years of drinking onset and before age 25 years. Nearly half (47%) of the respondents who ever experienced alcohol dependence were first diagnosable by age 21 years, and two thirds by age 25 years. Furthermore, the younger the age at drinking onset, the stronger the subsequent association with chronic relapsing dependence, characterized by multiple episodes, past-year dependence, and, among dependent persons, episodes of longer duration and a wider range of symptoms.

Several issues should be considered in interpreting these results. First, this cross-sectional survey required recall many years earlier by some respondents of the age at which they began to drink and whether they experienced antisocial tendencies or major depression during childhood. The analyses indicate that age at drinking onset and dependence relationships were strongest among

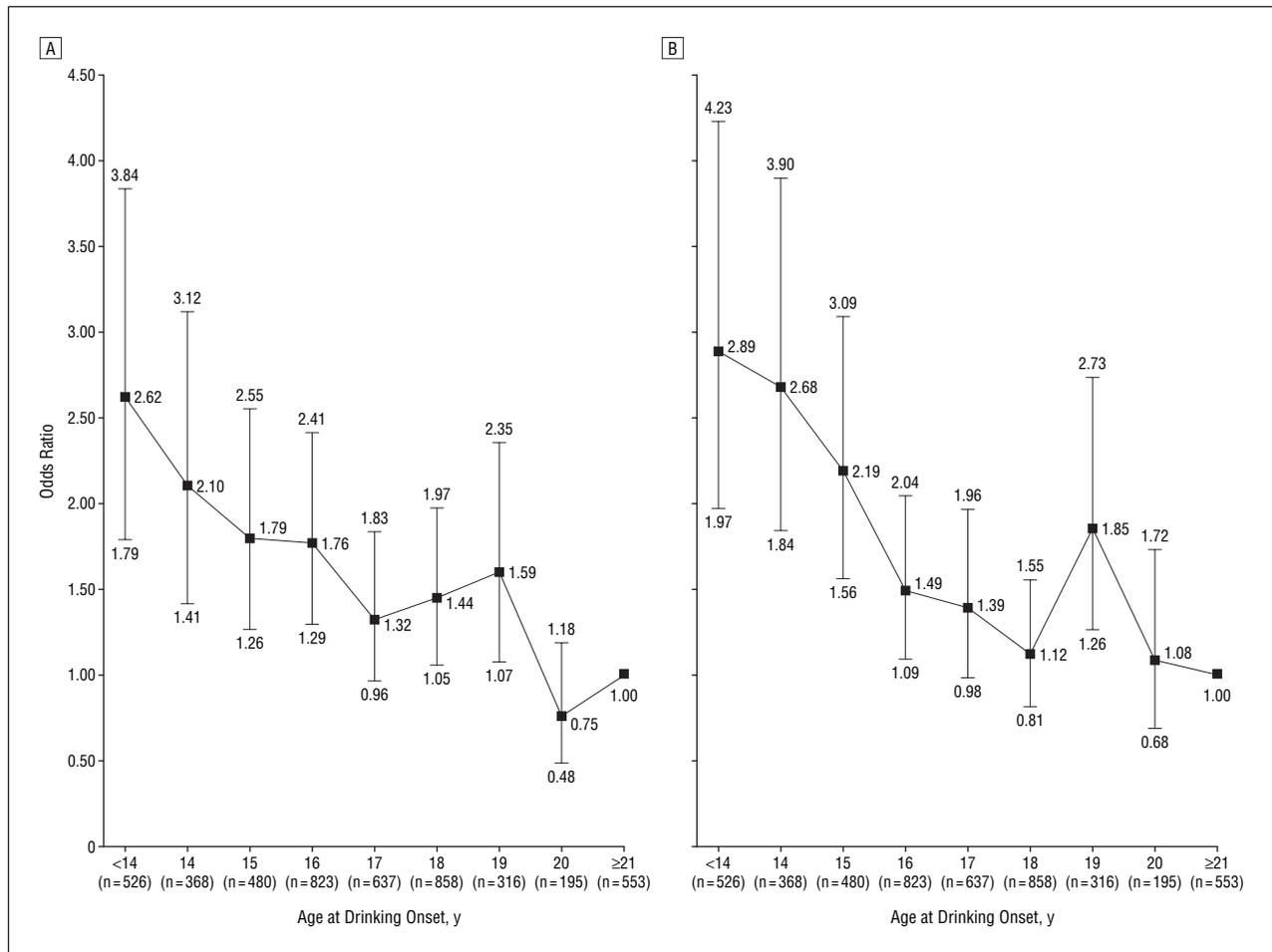


Figure 4. Mean adjusted odds ratios among persons ever alcohol dependent for duration of dependence of 1 year or more vs less than 1 year (A) and 6 or 7 dependence symptoms vs 3 to 5 (B) according to age started drinking. Odds ratios are relative to those who started drinking at 21 years or older controlling for age, sex, race/ethnicity, highest grade in school, current marital status, former and current smoking, former and current drug use, family history of alcoholism, antisocial behavior before age 15 years, and depression before age 14 years. Error bars represent 95% confidence intervals.

individuals younger than 34 years, for whom the recall period was shortest (data available on request).

Despite this survey's excellent response rates and analytic adjustments for respondent age and numerous personal and behavioral characteristics, longitudinal studies that begin during childhood, before drinking onset, and that follow adolescents into adult life would be preferable. They can prospectively test the potential age at drinking onset and alcohol dependence relation and may offer insights into mechanisms at work. A 12-year follow-up of the National Longitudinal Study of Youth found that earlier age at drinking onset is prospectively associated with alcohol dependence and abuse,²⁹ as did another analysis of a community sample followed longitudinally from age 12 to 30 years. That study found the strongest association among those who began drinking outside the home.³⁰

Second, social desirability biases may foster underreporting of alcohol use and associated problems, prompting underdiagnosis of alcohol dependence. On the other hand, persons willing to report heavy drinking may be less hesitant than others to report adverse drinking consequences. Also, people with alcohol dependence may be more likely to remember when they started drinking because of consequences experienced later in life, thereby

generating stronger relations between drinking onset age and alcohol dependence.

Third, consistent with age at earlier drinking onset research,⁶⁻⁹ the present analyses focused on drinkers as defined in the NLAES: respondents who drank 12 or more drinks in at least 1 year of their life. In the NESARC, 27 324 respondents (63%) met those criteria. We repeated our analysis with the larger subset of NESARC respondents who reported ever having 1 or more drinks (n=38 827; 81%) and observed the same pattern of relationships between age at drinking onset and dependence outcomes (data available on request).

Fourth, although extensive research has established the reliability of lifetime and past-year alcohol dependence based on *DSM-IV* criteria using the AUDADIS-IV, the reliability of numbers of dependence episodes and duration of episodes has not received the same attention, and their association with drinking onset requires more cautious interpretation. Furthermore, some researchers question whether the meaning of *DSM-IV* criteria differs in adolescents and adults. During adolescence, increased tolerance to alcohol is probably a normal developmental phenomenon.³¹ Also, the criteria "using more than intended" among adolescents may have more

to do with social influences than the compulsion to drink.^{32,33} In this study, almost all the persons diagnosed as being dependent reported these symptoms regardless of age at drinking onset.

Fifth, potential confounding variables not considered may have been responsible for the observed relations. Genetic factors, disinhibitory behavior patterns, and other psychiatric disorders may relate to early drinking onset and the development of alcohol dependence.¹³ Also, children who experienced overt physical, sexual, or psychological abuse or whose parents exhibited psychiatric symptoms may start to drink at an earlier age and may drink larger amounts to cope with posttraumatic stress disorders. Of note, less than 1% of persons who ever drank met the DSM-IV criteria for dysthymia or generalized anxiety before age 14 years, and inclusion of these variables in regression analyses negligibly affected the study results.

A study³⁴ of sibling/twin/adopted adolescents aged 12 to 19 years reported that alcohol use in that age group is minimally affected by genetics but rather largely arises from environmental effects. Similar findings were reported in an analysis comparing persons with a family history of alcoholism and controls.³⁵ The strength of genetic effect on adolescent drinking has been found to increase from middle to late adolescence³⁶ and to overlap extensively with genetic effects on other disinhibited behaviors.^{37,38} Thus, environmental factors may be most predictive of initial alcohol exposure, and environmental and genetic factors may interact in the development of lifetime, early-onset, and chronic relapsing dependence. Future research assessing these gene-environmental interactions should examine whether age at first drink or age at first alcohol dependence is more predictive of chronic relapsing dependence.

Sixth, although this analysis controlled for family history of alcoholism, many children born to nonalcoholic parents may nonetheless be raised in environments that allow youth easier access to alcohol. Also, some respondents may have had peers who engaged in heavy drinking and drug use that, in turn, contributed to earlier and heavier drinking, thereby fostering dependence.

Research is needed in different cultural settings. A Canadian study³⁹ found that early age at onset was related to subsequent alcohol dependence, despite a lower legal drinking age. Recent research⁴⁰ found that 29 of 30 European countries that have lower legal drinking ages than the United States had higher percentages of 15-year-olds who drink. Most of these countries also had a higher percentage of 15-year-olds who drink heavily (≥ 5 drinks per occasion) and to intoxication. However, Italy, France, Portugal, and Greece had similar or smaller percentages than the United States. Whether young people in those countries are more likely to drink with family and in meal settings and whether such practices moderate risks posed by early drinking warrant study.

These methodological considerations notwithstanding, this study reinforces important concerns about youth starting to drink at early ages. The human brain is still developing into the middle 20s. Some investigators have reported that compared with demographically matched nondependent adolescents from similar communities, adolescents who are dependent exhibit decrements in

memory, spatial relations, and planning, and in magnetic resonance imaging studies exhibited less hippocampal development.^{41,42} Whether these decrements preceded and contributed to the development of alcohol dependence and whether these problems will resolve if drinking is curtailed are not known. It is, however, known that alcohol dependence during the adult years is associated with visuospatial, executive, psychomotor, and memory decrements⁴³; smaller brain volume⁴⁴⁻⁴⁶; and a host of social, work-related, and health problems.⁴⁷

Recent clinical trials indicate that motivational counseling interventions can result in decreases in drinking and alcohol-related negative consequences among adolescents and college students.^{48,49} Also, raising the legal drinking age to 21 years reduced drinking, alcohol-related traffic deaths, and deaths from other unintentional injuries among persons younger than 21 years.⁵⁰⁻⁵² A national analysis found that the law also reduced drinking among persons when they became 21 to 25 years of age,⁵² but the effect of the law on the proportion of persons who develop alcohol dependence during adolescence or the adult years has not been studied. In addition studies have not examined whether other interventions that delay drinking onset also reduce the development of alcohol dependence during adolescence and adulthood. Although the results of this study suggest that such an impact is plausible, confirmatory longitudinal experimental research is needed. Whether interventions can delay the onset of alcohol use among adolescents and, in turn, reduce the development of alcohol dependence during adolescence and the adult years and its wide range of adverse consequences is a research question of vast medical, social, and public health importance.

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