

## **CHAPTER 2**

# **The Nature and Extent of Underage Drinking in America**

## **Introduction**

Underage drinking and its associated problems have profound negative consequences for underage drinkers themselves, their families, their communities, and society as a whole. Underage drinking contributes to a wide range of costly health and social problems including motor vehicle crashes (the greatest single mortality risk for underage drinkers); suicide; interpersonal violence (e.g., homicides, assaults, and rapes); unintentional injuries such as burns, falls, and drowning; brain impairment; alcohol dependence; risky sexual activity; academic problems; and alcohol and drug poisoning. Alcohol is a factor related to approximately 4,700 deaths among underage youths in the United States every year, shortening their lives by an average of 60 years (Centers for Disease Control [CDC], 2011).

Despite laws against underage drinking in all 50 States; the efforts of Federal, State, and local governments spanning decades; and the dedicated work of many private groups and organizations, alcohol is the most widely consumed substance of abuse among America's youth, used more often than tobacco or marijuana. Underage alcohol use remains a challenging public health and public safety problem with severe consequences for youth and their families, communities, and society. For those under 21 years of age, alcohol accounts for more deaths than all other illicit drugs combined. Nevertheless, a lack of public recognition of the devastating consequences of underage alcohol use and its personal, economic, and social costs hampers implementation of a comprehensive prevention effort.

Still, there is cause for optimism. As discussed in Chapters 3 and 4 of this Report, States are increasingly adopting comprehensive policies and practices that can alter the individual and environmental factors that contribute to underage drinking and its consequences and can be expected to reduce alcohol-related deaths and disability and associated healthcare costs.

## **Federal Surveys Used in This Report**

The Federal Government funds three major national surveys that collect data on underage drinking and its consequences: the annual National Survey on Drug Use and Health (NSDUH), formerly called the National Household Survey on Drug Abuse (NHSDA); the annual Monitoring the Future (MTF) survey; and the biennial Youth Risk Behavior Survey (YRBS). Each makes a unique contribution to an understanding of the nature of alcohol use.

Four additional surveys used by the Government to obtain data on underage drinkers ages 18 and older are the Behavioral Risk Factor Surveillance System (BRFSS); National Epidemiologic Survey on Alcohol and Related Conditions (NESARC); National Health Interview Survey (NHIS); and Survey of Health Related Behaviors Among Active Duty Military Personnel (formerly called the Worldwide Surveys of Substance Abuse and Health Behaviors Among Military Personnel). A more detailed description of each of these surveys and its unique contribution to research can be found in Appendix A. Data from these and other surveys and research efforts continue to paint a troubling picture of underage alcohol use in America.

## **Characteristics of Underage Drinking in America**

Underage alcohol use in America is a public health problem because of the number of children and adolescents who drink, when and how much they drink, and the negative consequences that

result from that drinking. Some of the principal findings of governmental surveys and other research related to underage alcohol use in America are described in the following paragraphs.

### **Underage Alcohol Use Is Widespread**

Underage alcohol use in America is a widespread and serious problem:

- **Current Use:** The 2010 NSDUH reported that approximately 26.3 percent of Americans ages 12 through 20 (about 10.0 million people) reported having at least one drink in the 30 days prior to the survey interview. Of this age group, 17.0 percent (6.5 million) were binge drinkers (five or more drinks on the same occasion, e.g., at the same time or within a couple of hours) on at least 1 day in the past 30 days. Approximately 5.1 percent of this age group (2.0 million) were heavy drinkers (five or more drinks on the same occasion on each of 5 or more days in the past 30 days). By definition, all heavy alcohol users are also binge alcohol users (Substance Abuse and Mental Health Services Administration [SAMHSA], 2011).
- **Lifetime Use:** MTF 2010 showed that 71.0 percent of 12th, 58.2 percent of 10th, and 35.8 percent of 8th graders have had alcohol at some point in their lives<sup>7</sup> (Exhibit 2.1) (Johnston, O'Malley, Bachman, & Schulenberg, 2011a).
- **Binge Use:** The 2010 NSDUH showed that 4.1 percent of 14-year-olds, 12.4 percent of 16-year-olds, 28.5 percent of 18-year-olds, and 37.3 percent of 20-year-olds engaged in binge drinking within the past 30 days (SAMHSA, 2011, detailed tables).
- **Heavy Use:** The 2010 NSDUH data showed that 2.7 percent of 16-year-olds, 8.2 percent of 18-year-olds, and 13.7 percent of 20-year-olds consumed alcohol heavily in the past 30 days (SAMHSA, 2011, detailed tables).
- **Use to Intoxication:** In MTF 2010, 54.1 percent of 12th, 36.9 percent of 10th, and 16.3 percent of 8th graders reported having been drunk<sup>8</sup> at least once (Johnston et al., 2011a).
- **Past-Month Intoxication:** In MTF 2010, 26.8 percent of 12th, 14.7 percent of 10th, and 5.0 percent of 8th graders reported being drunk in the past month (Johnston et al., 2011a).

### **Alcohol Is the Most Widely Used Substance of Abuse Among American Youth**

As indicated in Exhibit 2.2, a higher percentage of youth in 8th, 10th, and 12th grades used alcohol in the month prior to being surveyed than used tobacco or marijuana, the illicit drug most commonly used by adolescents (Johnston et al., 2011a).

### **Youth Start Drinking at an Early Age**

Drinking often begins at very young ages. Surveys indicate that approximately:

1. Ten percent of 9- to 10-year-olds have already started drinking<sup>9</sup> (Donovan et al., 2004).
2. More than one fifth of underage drinkers begin drinking before age 13 (Eaton et al., 2010).
3. Peak years of initiation are 7th through 11th grades based on data from high school seniors (Johnston, O'Malley, Bachman, & Schulenberg, 2009a).

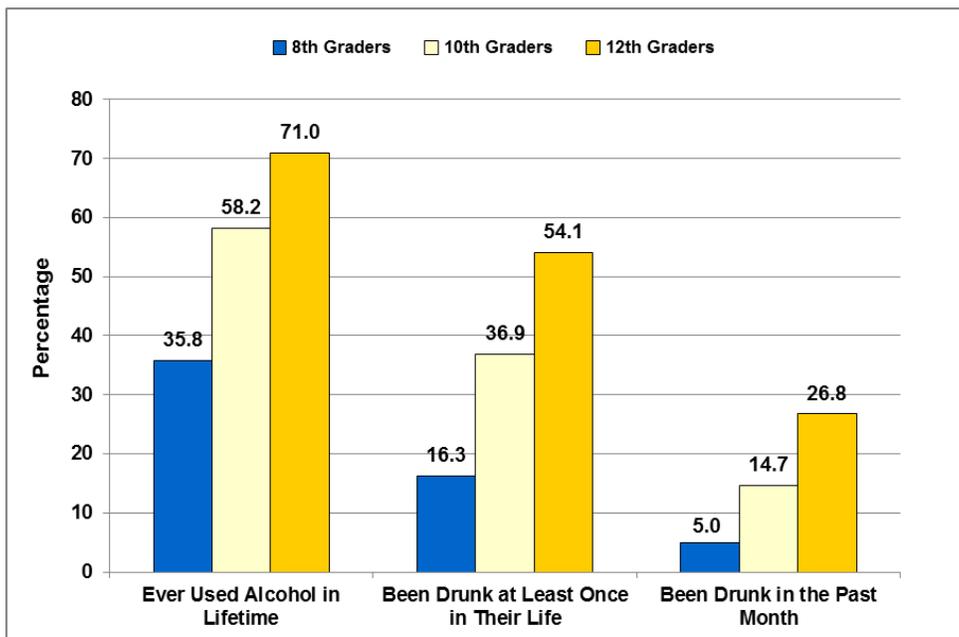
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<sup>7</sup> Lifetime alcohol use in this survey is defined as "having more than a few sips."

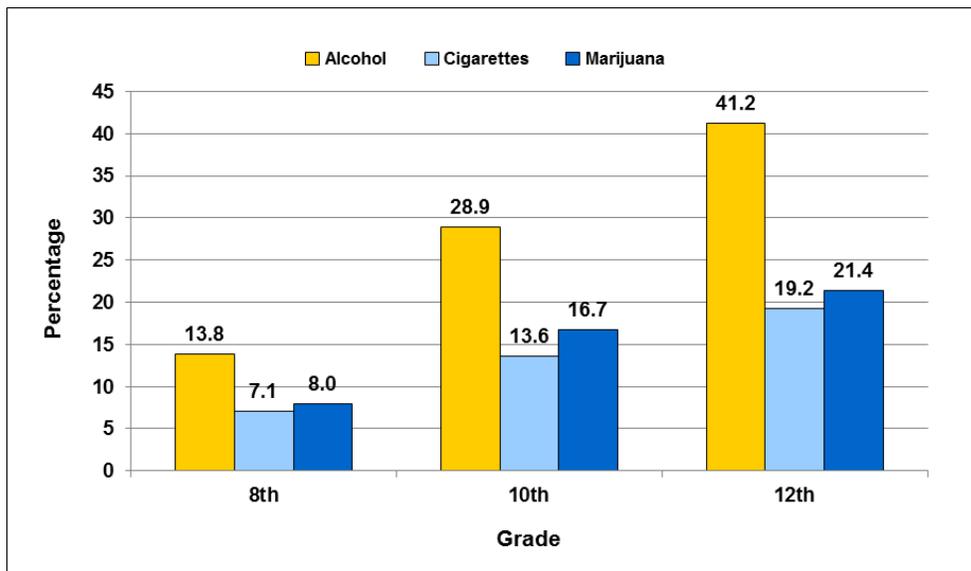
<sup>8</sup> MTF asks "On how many occasions (if any) have you been drunk or very high during the past 30 days?"

<sup>9</sup> Drinking is defined as having more than a few sips.

**Exhibit 2.1: Lifetime Alcohol Use, Use to Intoxication, and Use to Intoxication Within the Past Month Among 8th, 10th, and 12th Graders: 2010 (Johnston et al., 2011a)**



**Exhibit 2.2: Past-Month Adolescent Alcohol, Cigarette, and Marijuana Use by Grade: 2010 (Johnston et al., 2011a)**



An estimated 2,490 young people ages 12 to 14 initiated alcohol use per day in 2010 (SAMHSA, 2011). This translates into slightly fewer than 1 million (910,000) youths under 15 years old initiating alcohol use each year. Youths who report drinking before age 15 are more likely to experience problems including intentional and unintentional injury to self and others after drinking (Hingson & Zha, 2009; Hingson, Heeren, Jamanka, & Howland, 2000); violent behavior, including predatory violence and date violence (Blitstein, Murray, Lytle, Birnbaum, & Perry, 2005; Ellickson, Tucker, & Klein, 2003; Ramisetty-Mikler, et al., 2006); criminal behavior (Eaton, Davis, Barrios, Brener, & Noonan, 2007); prescription drug misuse (Hermos et al., 2008); unplanned and unprotected sex (Hingson, Heeren, Winter, & Wechsler, 2003); motor vehicle crashes (Hingson, Heeren, Levenson, Jamanka, & Voas, 2002); and physical fights (Hingson, Heeren, & Zakocs, 2001). Early-onset drinking is thus a marker for future problems, including heavier use of alcohol and other drugs during adolescence (Robins & Przybeck, 1985; Hawkins et al., 1997) and alcohol dependence in adulthood (Grant & Dawson, 1998). Delaying the age of first alcohol use can ameliorate some of the negative consequences of underage alcohol consumption, so trends in age of initiation of alcohol use are important to follow.

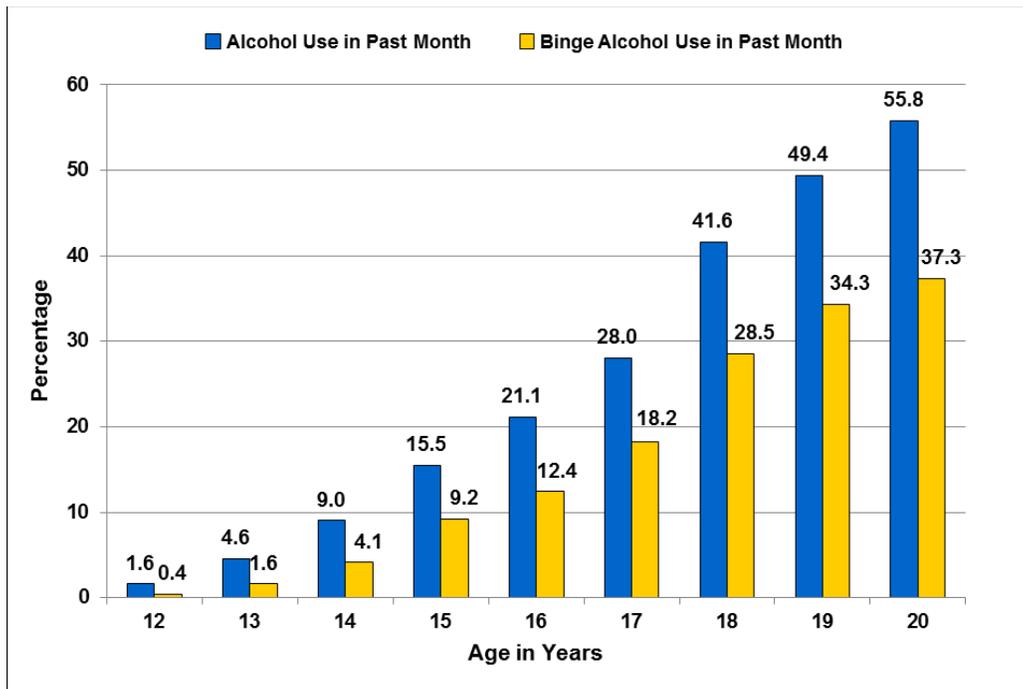
MTF data show that the proportion of 8th, 10th, and 12th graders who had ever used alcohol and the proportion of those who started using alcohol before 7th grade generally declined from 1998 to 2010, suggesting a possible delay in the age at first use (Johnston et al., 2011a).

SAMHSA revised its methodology to provide more timely estimates that will more accurately assess trends in average age at first use and other measures of initiation, such as incidence rates. Average age of first use is now calculated based on initiation within the past 12 months. Using this new method, NSDUH data indicate no difference in the average age of first use (15.6 years) among those who initiated alcohol use prior to age 21 between 2004 and 2005, but a significant increase to 15.8 years in 2006 (SAMHSA, 2007). The average age of first use then remained nearly the same in 2007 (15.8 years) (SAMHSA, 2008), 2008 (15.9 years) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2009), and 2009 (15.9 years) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010) before a statistically significant increase in 2010 (16.1 years) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011). Average age of first use for all drinkers, including those who started drinking at age 21 or over, was 16.6 in 2006 (SAMHSA, 2007), 17.0 in 2007 (SAMHSA, 2008), 17.7 in 2008 (SAMHSA, 2009), 17.1 in 2009 (SAMHSA, 2010), and 18.0 in 2010 (SAMHSA, 2011b, detailed tables). Appendix A further discusses methodological issues in measuring age at first use and other indicators of alcohol initiation.

### **For Underage Drinkers, Alcohol Use and Binge Drinking Increase With Age**

Drinking becomes increasingly common through the teenage years (O'Malley, Johnston, & Bachman, 1998). Frequent, heavy use by underage drinkers also increases each year from age 12 to age 20 (Flewelling, Paschall, & Ringwalt, 2004). The 2010 NSDUH reports that underage alcohol consumption in the past month increased with age in a steady progression from 1.6 percent for 12-year-olds to 55.8 percent for 20-year-olds and peaked at 71.6 percent for 21-year-olds (SAMHSA, 2011b). As shown in Exhibit 2.3, binge drinking also increased steadily between the ages of 12 and 20, peaking at age 21 (47.9 percent) and then decreasing beyond young adulthood (data not shown) (SAMHSA, 2010, detailed tables). Approximately 6.5 million (17.0 percent) of 12- to 20-year-olds reported past-month binge alcohol use (SAMHSA, 2011b).

**Exhibit 2.3: Current and Binge Alcohol Use Among Persons Ages 12 to 20 by Age: 2010 (SAMHSA, 2011)**

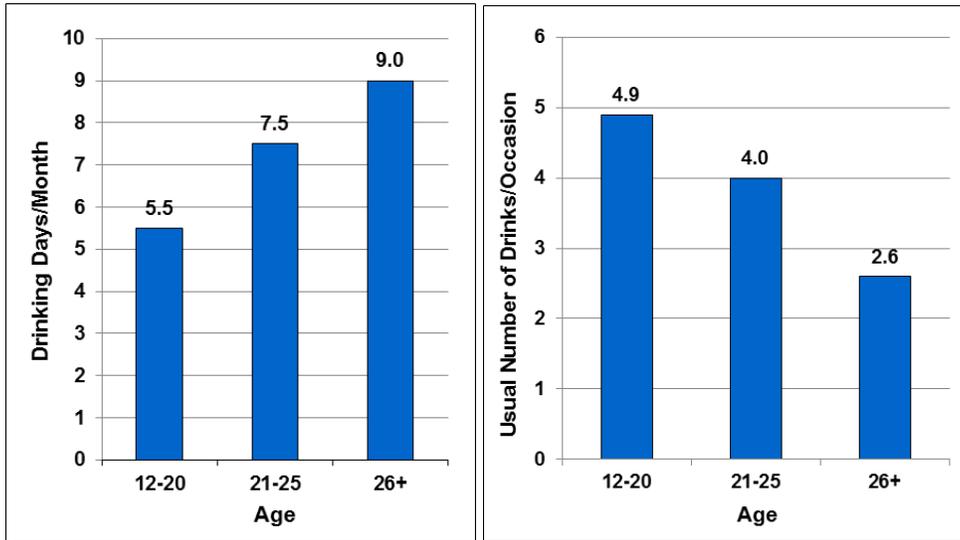


### Youth Binge More and Drink More Than Adults When They Drink

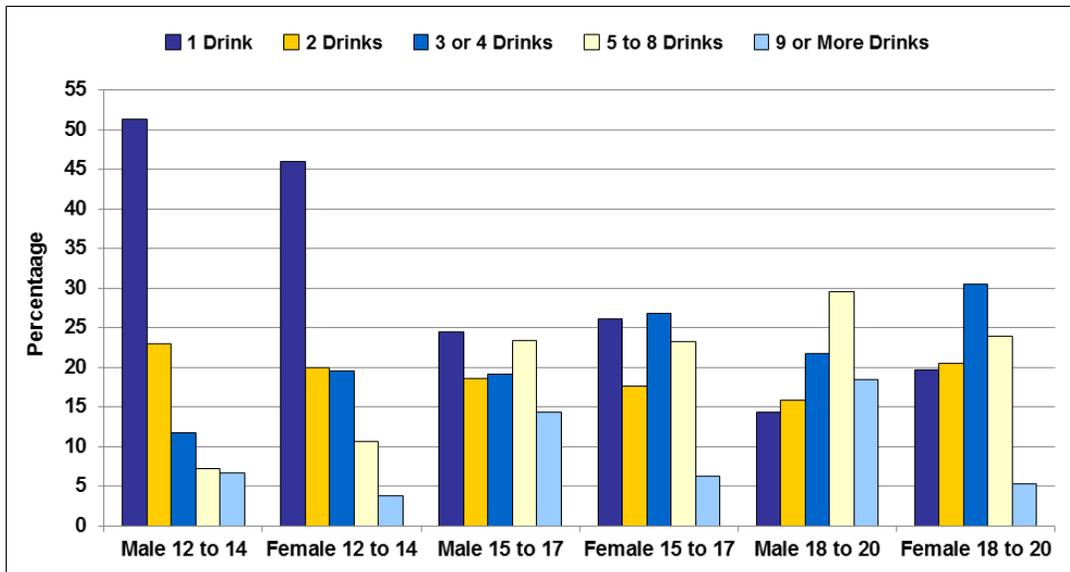
Young drinkers tend to drink less often than adults, but they drink more heavily when they do drink. For example, 92 percent of the alcohol consumed by 12- to 14-year-olds is via binge drinking (Pacific Institute for Research and Evaluation [PIRE], 2002). Underage drinkers consume, on average, about five drinks per occasion, about six times a month (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011), whereas adult drinkers 26 and older average three drinks per occasion, about nine times a month (Exhibit 2.4) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011). It is important to note that very young adolescents, because of their smaller size, reach blood alcohol concentrations (BACs) achieved by older binge-drinking adolescents (e.g., age 18 or older) with fewer drinks (3–4 drinks for persons ages 12–15) (Donovan, 2009).

When asked about the number of drinks consumed on their last occasion of alcohol use in the past month, 20.8 percent of underage drinkers reported one drink; 18.2 percent, two drinks; 24.3 percent, three or four drinks; 25.1 percent, 5 to 8 drinks; and 11.7 percent, nine or more drinks for 2009 and 2010 combined (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011). The number of drinks consumed differs by gender (Exhibit 2.5); underage females are more likely to report consuming one to four drinks; underage males, consuming five to nine drinks or more. The number of drinks reported on the last occasion tends to increase with increasing age.

**Exhibit 2.4: Number of Drinking Days per Month and Usual Number of Drinks per Occasion for Youth (12–20), Young Adults (21–25), and Adults (≥26): 2010 (SAMHSA, CBHSQ, NSDUH, Special Data Analysis, 2011)**



**Exhibit 2.5: Number of Drinks Consumed on Last Occasion of Alcohol Use in the Past Month Among Past-Month Alcohol Users Ages 12 to 20, by Gender and Age Group: 2009–2010 (SAMHSA, CBHSQ, NSDUH, Special Data Analysis, 2011)**



Particularly worrisome is the high prevalence among underage drinkers of binge drinking, which MTF defines as five or more drinks in a row in the past 2 weeks and calls “heavy episodic drinking.” In 2010, 7.2 percent of 8th, 16.3 percent of 10th, and 23.2 percent of 12th graders reported heavy episodic drinking (Johnston et al., 2011a). In 2010, about 2.0 million youth ages 12 through 20 (5.1 percent) drank five or more drinks on a single occasion<sup>10</sup> 5 or more days a month (SAMHSA, 2011a).

Faden and Fay (2004) used sophisticated statistical trend analyses to examine underage drinking data from 1975 to 2002. Among 12th graders, drinking five or more drinks in a row in the past 2 weeks declined 7.6 percent, from 36.8 percent in 1975 to 29.2 percent in 2004. Analysis of data from the intervening years showed that the prevalence of drinking five or more drinks in a row in the past 2 weeks rose from 1975 to 1980, fell from 1980 to 1987, steeply declined from 1987 to 1993, rose between 1993 and 1997, and declined between 1997 and 2002 (Faden & Fay, 2004). Utilizing the same technique, subsequent analyses showed that among 12th graders the prevalence of drinking five or more drinks in a row in the past 2 weeks continued to fall between 2002 and 2009 (Chen, Yi, & Faden, 2011).

Information on the prevalence of drinking five or more drinks in a row in the past 2 weeks among 8th and 10th graders first became available in 1991. In 1991, 10.9 percent of 8th graders and 21 percent of 10th graders reported engaging in this behavior compared with 9.4 percent and 19.9 percent, respectively, in 2004. Rates in the intervening years oscillated heavily for 8th graders and rose steadily for 10th graders, for whom rates peaked in 2000 and have since gradually declined (Johnston, O’Malley, Bachman, & Schulenberg, 2005). Data for ensuing years suggests that these trends are continuing to move in the same direction (Johnston et al., 2009a).

### **Binge Drinking by Teens Is Not Limited to the United States**

In many European countries, a significant proportion of young people ages 15 to 16 report binge drinking (Exhibit 2.6).

In all countries listed in Exhibit 2.6, the minimum legal drinking age is lower than in the United States. These data call into question the suggestion that having a lower minimum legal drinking age results in less problem drinking by adolescents.

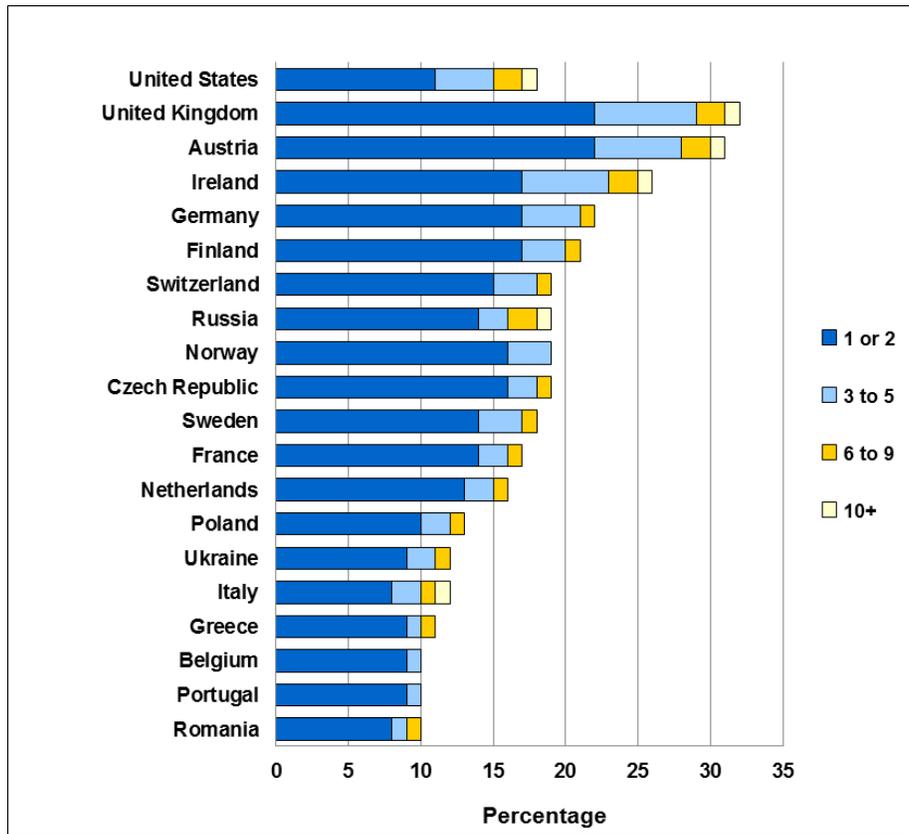
### **There Is a High Prevalence of Alcohol Use Disorders Among Youth**

The prevalence of alcohol abuse or dependence among underage drinkers is quite high. Ascertaining the prevalence of alcohol use disorders among younger drinkers is complicated by the use of criteria meant for adults to measure alcohol abuse and dependence in younger drinkers. Because the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, text revision* (DSM-IV-TR) (APA, 2000) criteria for abuse and dependence were originally developed for use with adults, using them to assess abuse and dependence in adolescents may

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<sup>10</sup> If a typical 160-pound male drinks five standard drinks over a 2-hour period, he would reach a blood alcohol content of .08, making him legally intoxicated in all 50 States.

**Exhibit 2.6: Percentage of European Students Ages 15–16 Who Reported Being Drunk in the Past 30 Days\* Compared With American 10th Graders (Hibell et al., 2009; Data from the 2007 European School Survey Project on Alcohol and Drugs<sup>11</sup>)**



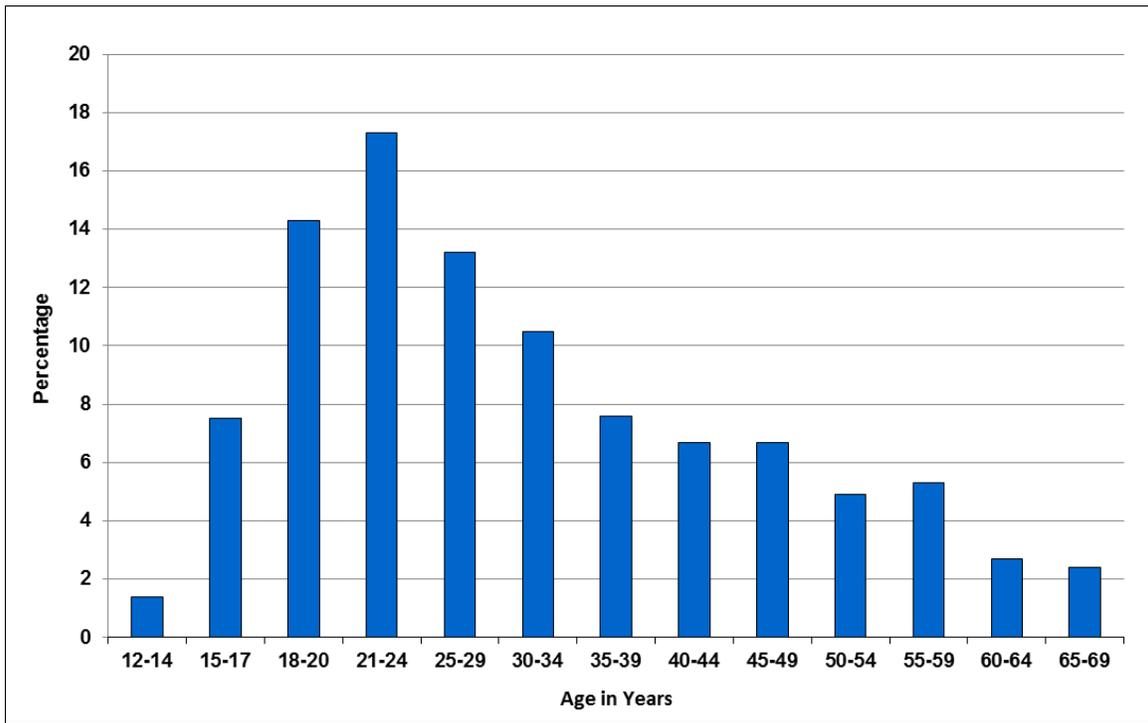
\*The 2007 European School Survey Project on Alcohol and Drugs question is: “On how many occasions (if any) have you been intoxicated from drinking alcoholic beverages (staggered when walking, not able to speak properly, throwing up or not remembering what happened)?”

lead to inconsistencies.<sup>12</sup> As shown in Exhibit 2.7, according to the combined 2009 and 2010 NSDUH data, prevalence of alcohol dependence or abuse is highest among those ages 18 to 29. About one in seven (14.3 percent) 18- to 20-year-olds met criteria for alcohol dependence or abuse, a prevalence rate second only to that for 21- to 24-year-olds (17.3 percent) and slightly higher than that for 25- to 29-year-olds (13.2 percent). In addition, 1.4 percent of 12- to 14-year-olds and 7.5 percent of 15- to 17-year-olds met criteria for alcohol dependence or abuse.

<sup>11</sup> The European School Survey Project on Alcohol and Drugs (ESSPAD) is conducted every 5 years. The most recent survey was conducted in spring 2011, and data will be available in spring 2012.

<sup>12</sup> Several researchers are actively investigating this important issue (Harford, Yi, Faden, & Chen, 2009; Mewton, Teesson, Slade, & Grove, 2010). The American Psychiatric Association (APA) is also addressing the appropriateness of the current DSM-IV-TR criteria for measuring alcohol abuse and dependence in the young as it prepares to launch DSM-V in 2013. See American Psychiatric Association DSM-V Development at <http://www.dsm5.org/Pages/Default.aspx>.

**Exhibit 2.7: Prevalence of Past-Year DSM-IV Alcohol Dependence or Abuse by Age: 2009–2010 NSDUH (SAMHSA, CBHSQ, Special Analyses, 2011)**



### Underage Drinking Differs by Gender

Although underage males and females tend to start drinking at about the same age and have approximately the same prevalence of any past-month alcohol use, males are more likely to drink with greater frequency and to engage in binge and heavy drinking. According to the 2010 NSDUH data, 57.4 percent of males ages 12 and older were current drinkers compared with 46.5 percent of females in that age group. However, among underage drinkers, gender differences varied with age. Among individuals ages 12 to 13, rates of current drinking were very similar: 3.6 percent for males and 3.4 percent for females. Among 14- and 15-year-olds, 13.8 percent of females reported current use compared with 12.3 percent of males. Among those ages 16 to 17, 27.9 percent of the males and 24.7 percent of females reported being current drinkers. By ages 18 to 20, 52.1 percent of males and 47.0 percent of females reported past-month alcohol use (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010).

Binge-drinking prevalence is the most significant gender difference, at least among older adolescents. In 2010, 28.0 percent of male 12th graders reported binge drinking (having five or more drinks in a row) at least once in the prior 2-week period, whereas 18.4 percent of female 12th graders did (Johnston et al., 2011a). However, the gender gap is closing. In 1975, there was a 23 percentage point spread between the rates; in 2010, it was 9.6 points (Johnston et al., 2011a).

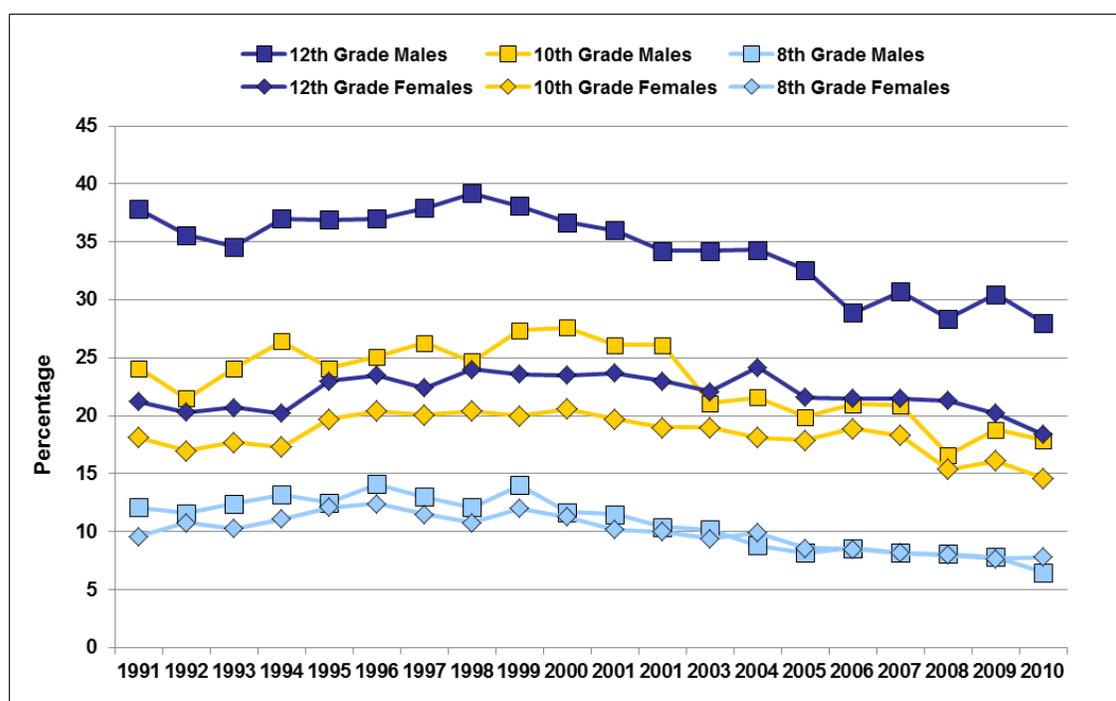
Female bingeing rates are comparable to those for males among younger age groups, whereas male bingeing rates increase more rapidly with age. The 2009 NSDUH data showed past-month binge drinking in 1.7 percent of male and 1.6 percent of female 12- to 13-year-olds, 7.3 percent

of male and 6.7 percent of female 14- to 15-year olds, 18.7 percent of male and 15.2 percent of female 16- to 17-year-olds, and 39.8 percent of male and 29.3 percent of female 18- to 20-year-olds (SAMHSA, 2010). MTF, which began collecting data from 8th and 10th graders in 1991, reports similar results. Among 8th graders, females began steadily gaining on males' binge drinking rates in 1991, with equal rates for both genders since 2004 (Exhibit 2.8) (Johnston et al., 2009c, 2011a).

### Underage Drinking by Race and Ethnicity

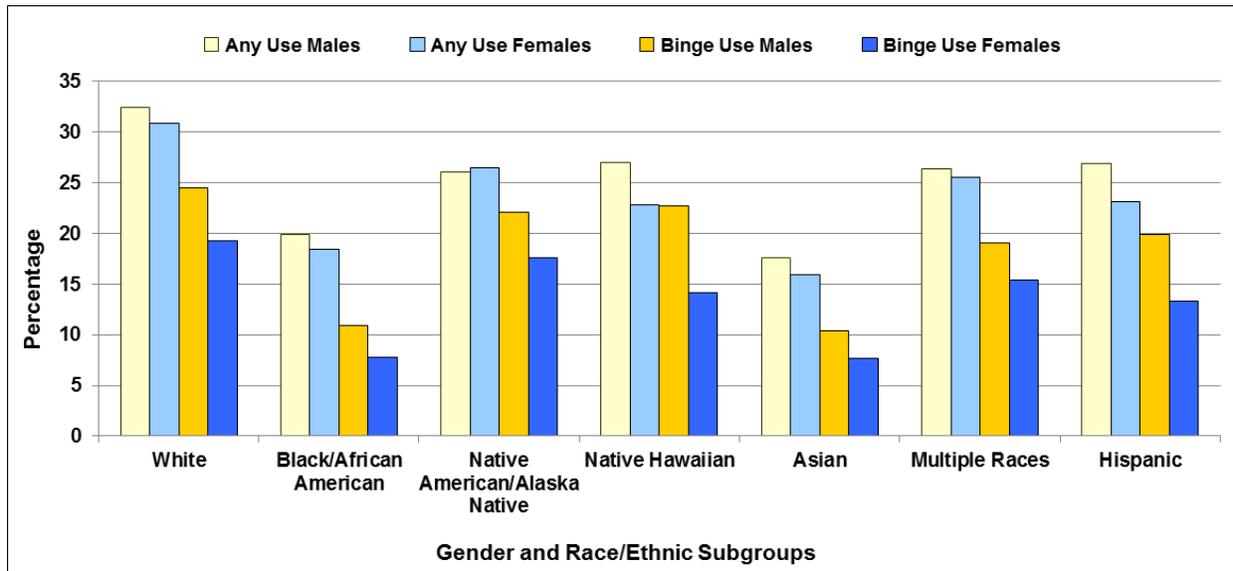
According to the 2002–2010 NSDUH data,<sup>13</sup> Whites ages 12 to 20 were more likely to report current use of alcohol than any other race or ethnic group. An estimated 32.4 percent of White males and 30.9 percent of White females reported past-month use, followed by Native Hawaiian or Other Pacific Islander males (27.0 percent), Hispanic or Latino males (26.9 percent), American Indian or Alaska Native females (26.5 percent), males of multiple races (26.4 percent), American Indian or Alaska Native males (26.1 percent), females of multiple races (25.5 percent), Hispanic or Latino females (23.1 percent), Native Hawaiian or Other Pacific Islander females (22.8 percent), Black or African American males (19.9 percent), Black or African American females (18.4 percent), Asian males (17.6 percent), and Asian females (15.9 percent). As shown in Exhibit 2.9, among most races/ethnic groups, males and females reported similar rates of current alcohol use; however, among Whites, Blacks and Hispanics, males ages 12 to 20 were more likely to report current use than females (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011). Although fewer Blacks report current drinking, data from the 2009 YRBS

**Exhibit 2.8: Rates of Binge Drinking in the Past 2 Weeks Among Male and Female 8th, 10th, and 12th Graders, 1991-2010 (Johnston et al., 2011a)**



<sup>13</sup> To provide sample sizes sufficient to produce reliable estimates for each race/ethnic group, multiyear estimates of past-month alcohol use and binge drinking by race/ethnicity were calculated.

**Exhibit 2.9: Alcohol Use and Binge Drinking in the Past Month Among Persons Ages 12 to 20 by Race/Ethnicity and Gender, Annual Averages Based on 2002–2010 Data (SAMHSA, CBHSQ, NSDUH, Special Data Analysis, 2011)**



suggest that the prevalence of alcohol use before age 13 is greater among Black students (24.9 percent) and Hispanic students (27.1 percent) than among White students (18.1 percent) (Eaton et al., 2010). Sample sizes from the MTF and the YRBS do not allow estimates of alcohol consumption by youth who are American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or multiple races.

Multiyear NSDUH data (2002–2010) show that White, American Indian and Alaska Native, and Hawaiian and Other Pacific Islander males ages 12 to 20 were equally likely to report binge alcohol use in the past month. An estimated 24.5 percent of White males reported having five or more drinks on the same occasion on at least 1 day within the past 30 days, followed closely by Native Hawaiian or Other Pacific Islander males (22.7 percent) and American Indian or Alaska Native males (22.1 percent). Hispanic males (19.9 percent), White females (19.3 percent), males of multiple races (19.1 percent), and American Indian or Alaska Native females (17.6 percent) reported similar rates of binge drinking, followed by females of multiple races (15.4 percent), Native Hawaiian or Other Pacific Islander females (14.1 percent), and Hispanic females (13.6). Black and Asian youth ages 12 to 20 were least likely to report binge drinking, with 10.9 percent of Black males, 10.4 percent of Asian males, 7.8 percent of Black females, and 7.7 percent of Asian females reporting the behavior. As shown in Exhibit 2.9, rates of binge drinking were higher among males than females for each race/ethnic group, with the differences being greatest among Native Hawaiian or Other Pacific Islanders (males 22.7 percent vs. females 14.1 percent) and Hispanics (males 19.9 percent vs. females 13.6 percent) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010).

These ethnic and racial differences must be viewed with some caution. As Caetano, Clark, and Tam (1998) note, there are important differences in alcohol use and related problems among ethnic and racial subgroups of Blacks, Hispanics, Asians, and Native Americans/Alaska Natives.

Moreover, the patterns of consumption for any group or subgroup represent a complex interaction of psychological, historical, cultural, and social factors inadequately captured by a limited set of labels. With these cautions in mind, however, the data discussed thus far highlight the importance of considering race and ethnicity in underage drinking prevention measures.

### Social Context of Alcohol Use

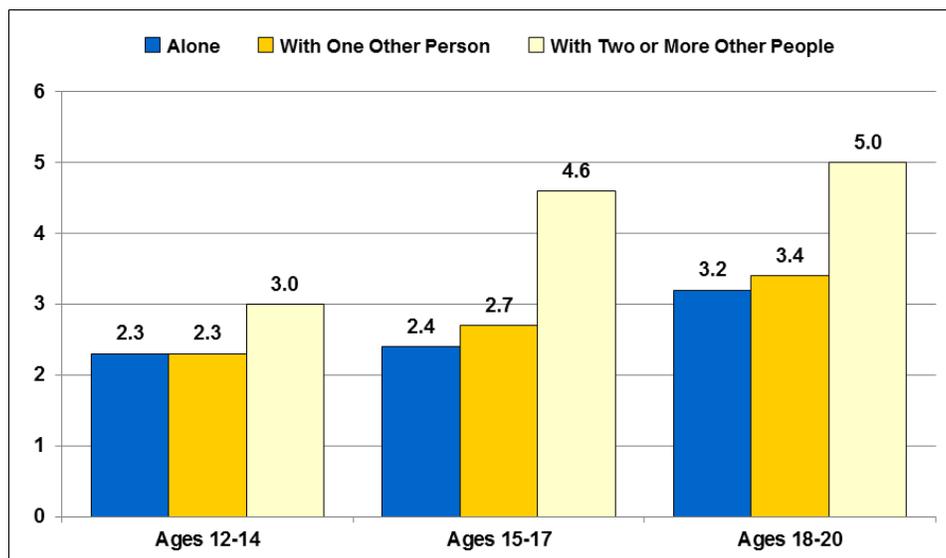
NSDUH began to collect data on the social context of last alcohol use in 2006. The following discussion combines data for 2009 and 2010. Most (81.5 percent) persons ages 12 to 20 who had consumed alcohol in the past month were with two or more people the last time they drank, 13.3 percent were with one other person the last time they drank, and 5.2 percent were alone.

Underage persons who drank with two or more other people on the last occasion in the past month had more drinks on the last occasion on average (4.8 drinks) than those who drank with one other person (3.1 drinks) or drank alone (2.9 drinks) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011; Pemberton, Colliver, Robbins, & Gfroerer, 2008).

The social context of drinking appears to differ across age groups. Among current drinkers, youths ages 12 to 14 were more likely to have been alone (9.8 percent) or with one other person (23.2 percent) the last time they drank compared with youths ages 15 to 17 (6.0 percent alone and 13.5 percent with one other person) or ages 18 to 20 (4.5 percent alone and 12.4 percent with one other person) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011). In all age groups, underage current drinkers who drank with two or more other people averaged more drinks on the last occasion than those who drank with one other person or alone (Exhibit 2.10).

Gender, too, interacts with social context in determining alcohol use. Most male and female underage drinkers were with two or more other people on their last drinking occasion. However, female drinkers were more likely to be with two or more people the last time they drank (83.2 percent) than were male drinkers (80.1 percent). On the other hand, male drinkers were more

**Exhibit 2.10: Drinks Consumed on Last Occasion of Alcohol Use in the Past Month Among Past-Month Alcohol Users Ages 12 to 20, by Social Context and Age Group, 2009–2010 (SAMHSA, CBHSQ, NSDUH, Special Data Analysis, 2011)**



likely to have been alone the last time they drank (6.9 percent) than were female drinkers (3.2 percent). Overall, underage persons who drank with two or more other people consumed more drinks on average (4.8) than those who drank alone (2.7) or with one other person (3.1). The same general pattern applied to both males and females, except that among males, the difference in the number of drinks consumed when drinking alone (3.1) and drinking with one other person (3.5) was not statistically significant. Males consumed more drinks than did females regardless of the social context; for example, when the last drinking occasion was with two or more other people, males averaged 5.5 drinks, compared with 3.9 drinks for females (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011).

### **Location of Alcohol Use**

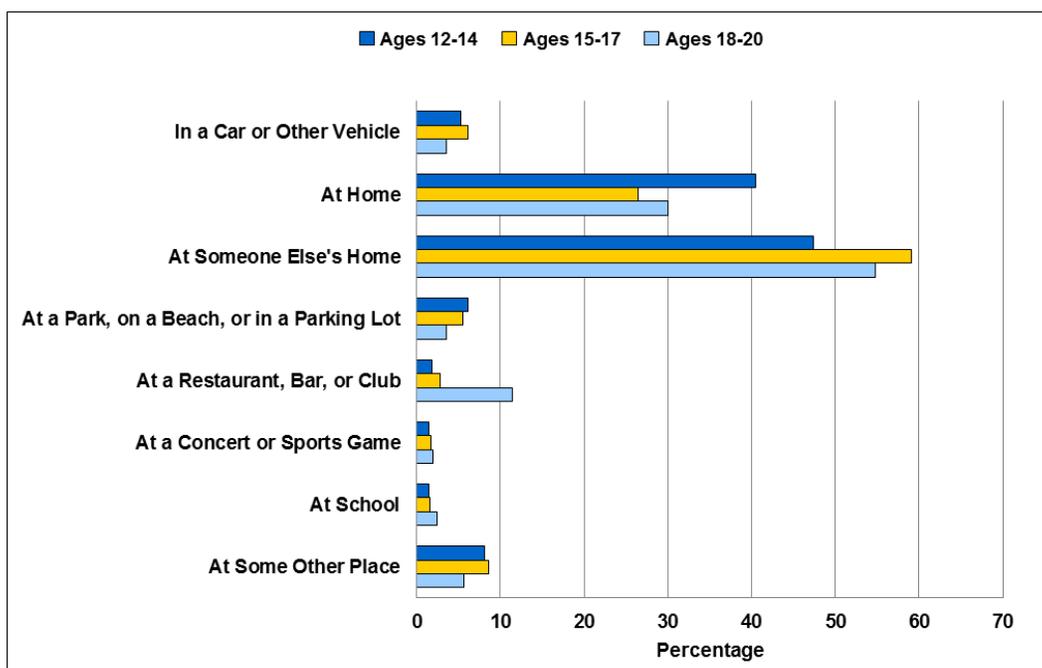
NSDUH began to collect data on location of last alcohol use in 2006. The following discussion combines data for 2009 and 2010. Most underage drinkers reported last using alcohol in someone else's home (55.6 percent, averaging 4.9 drinks) or their own home (29.5 percent, averaging 4.0 drinks). The next most popular drinking locations were at a restaurant, bar, or club (8.5 percent, averaging 4.9 drinks); at a park, on a beach, or in a parking lot (4.3 percent, averaging 5.2 drinks); or in a car or other vehicle (4.3 percent, averaging 5.2 drinks). Current drinkers ages 12 to 20 who last drank at a concert or sports game (1.8 percent of all underage drinkers) consumed an average of 6.3 drinks (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011). Thus, most young people drink in social contexts that appear to promote heavy consumption and where people other than the drinker may be harmed by the drinker's behavior.

According to estimates based on 2009–2010 NSDUH data, drinking location varies substantially by age. For example, drinkers ages 12 to 14 were more likely to have been in their own homes the last time they drank (40.5 percent) than were older adolescents (26.4 percent for 15- to 17-year-olds and 30.0 percent for 18- to 20-year-olds). By contrast, 12- to 14-year-olds were less likely to report being in someone else's home the last time they drank (47.4 percent) than the older age groups (59.1 percent for 15- to 17-year-olds and 54.8 percent for 18- to 20-year-olds).

Drinkers ages 18 to 20 were more likely than those in younger age groups to have been in a restaurant, bar, or club on their last drinking occasion (11.4 percent for those ages 18 to 20 versus 1.8 percent for those ages 12 to 14 and 2.8 percent for those ages 15 to 17) (Exhibit 2.11) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011). Female current alcohol users ages 12 to 20 were more likely than males to have had their last drink at a restaurant, bar, or club (10.3 percent versus 7.1 percent).

Taken together, these data suggest that underage drinking primarily occurs in a social context (three or more drinkers) at private residences. This conclusion is consistent with research that has found that underage drinking parties, where large groups of underage persons gather at private residences, are high-risk settings for binge drinking and associated alcohol problems (Mayer, Forster, Murray, & Wagenaar, 1998). Similar findings exist for college student binge drinking (Clapp, Shillington, & Segars, 2000).

**Exhibit 2.11: Drinking Location by Age Group, 2009–2010  
(SAMHSA, CBHSQ, NSDUH, Special Data Analysis, 2011)**



### Types of Alcohol Consumed by Underage Drinkers

Different alcohol beverage types are associated with different patterns of underage consumption. Differences in ease of concealment, palatability, alcohol content, marketing strategies, and economic and physical availability may all contribute to the quantity of and settings for consumption. Beverage preferences may also affect the policies and enforcement strategies most effective in reducing underage drinking (CDC, 2007). Tracking young people’s beverage preferences is thus an important aspect of prevention policy.

Exhibit 2.12, based on 2010 MTF data, indicates the type of alcohol consumed by underage drinkers in the 8th, 10th, and 12th grades within the past 30 days. The five alcohol categories listed are beer, wine, wine coolers, spirits, and flavored alcoholic beverages (FABs), which are sometimes called “flavored malt beverages,” “alcopops,” or “malternatives.” “Alcopops” are ready-to-drink, flavored alcoholic beverages that tend to be sweet and have between 4 and 6 percent alcohol by volume (similar to beer, which typically varies between 3 and 6 percent).

**Exhibit 2.12: Past-Month Underage Alcohol Use by Category (Johnston et al., 2011a)**

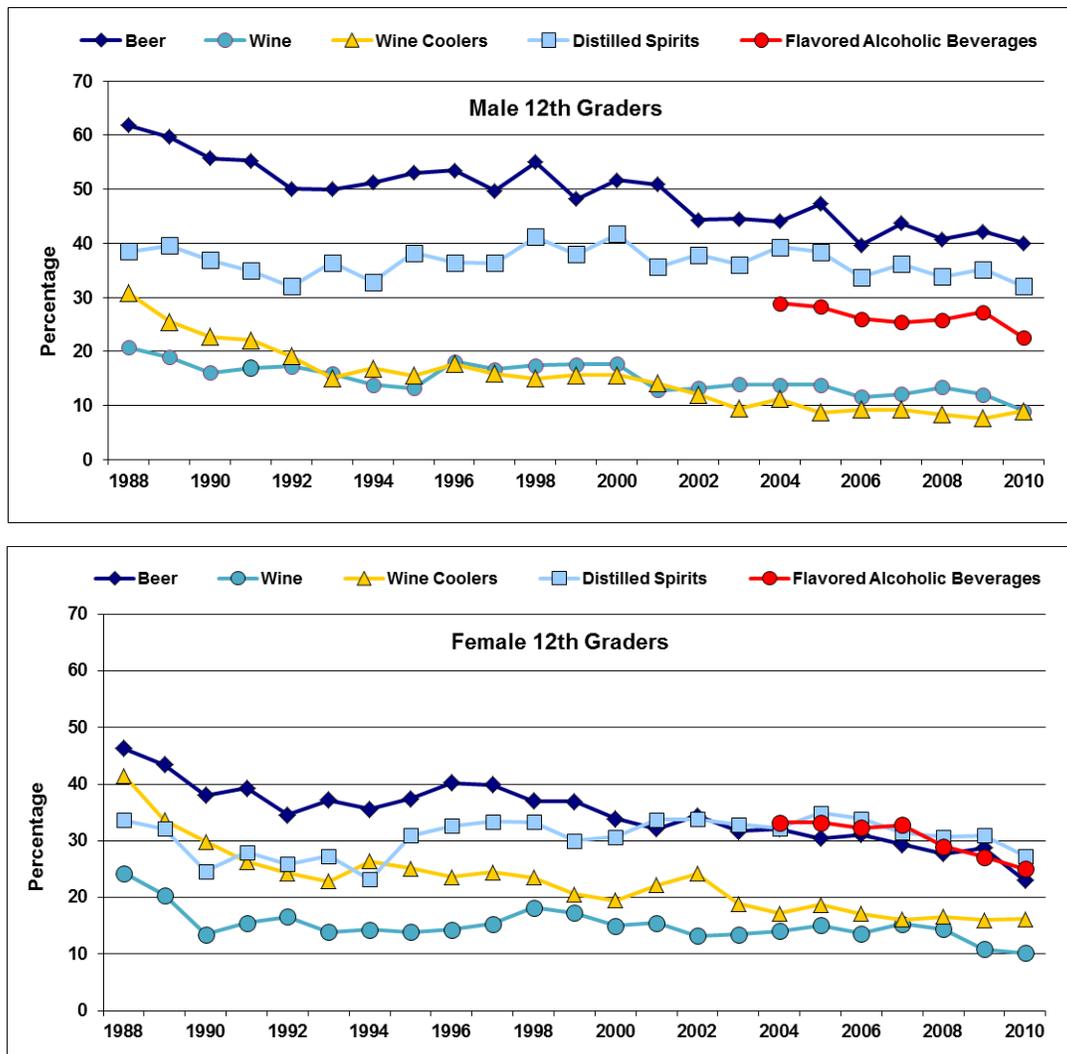
Grade	Beer	Wine	Wine Coolers	Spirits	Flavored Alcoholic Beverages
8	10.6%	n/c	n/c	n/c	9.4%
10	22.4%	n/c	n/c	n/c	19.4%
12	31.7%	9.3%	12.4%	29.8%	24.1%

Note: n/c indicates data not collected.

In some cases, the same adolescents reported drinking more than one type of alcohol. Thus, the percentage of adolescents for a given grade who have drunk alcohol may total more than 100 percent. For example, of 12th graders who drank alcohol in the 30 days before the survey, some percentage may have consumed both beer and wine. Distilled spirits have gained significantly in popularity among 12th graders over time. In 1988, 53.3 percent reported consuming beer in the past 30 days compared with 38.5 percent who reported distilled spirits consumption (Johnston et al., 2009c). By 2010, the gap in preferences had nearly disappeared, as shown in Exhibit 2.13.

Exhibit 2.13 shows that females, in particular, have shifted their beverage preference from beer to distilled spirits and FABs. In 1988, 46.3 percent of 12th grade females reported consuming beer compared with 33.6 percent reporting distilled spirits consumption. By 2010, the preference had shifted, with distilled spirits consumption remaining steady at 27.3 percent and beer consumption dropping to 23.0 percent. MTF data show that females have been more likely to prefer FABs than males since 2004 (Johnston et al., 2009a, 2011a).

**Exhibit 2.13: Trends in the Percentage of Male and Female 12th Graders Using Alcoholic Beverages by Beverage Type, 1988–2010 (Johnston et al., 2011a)**

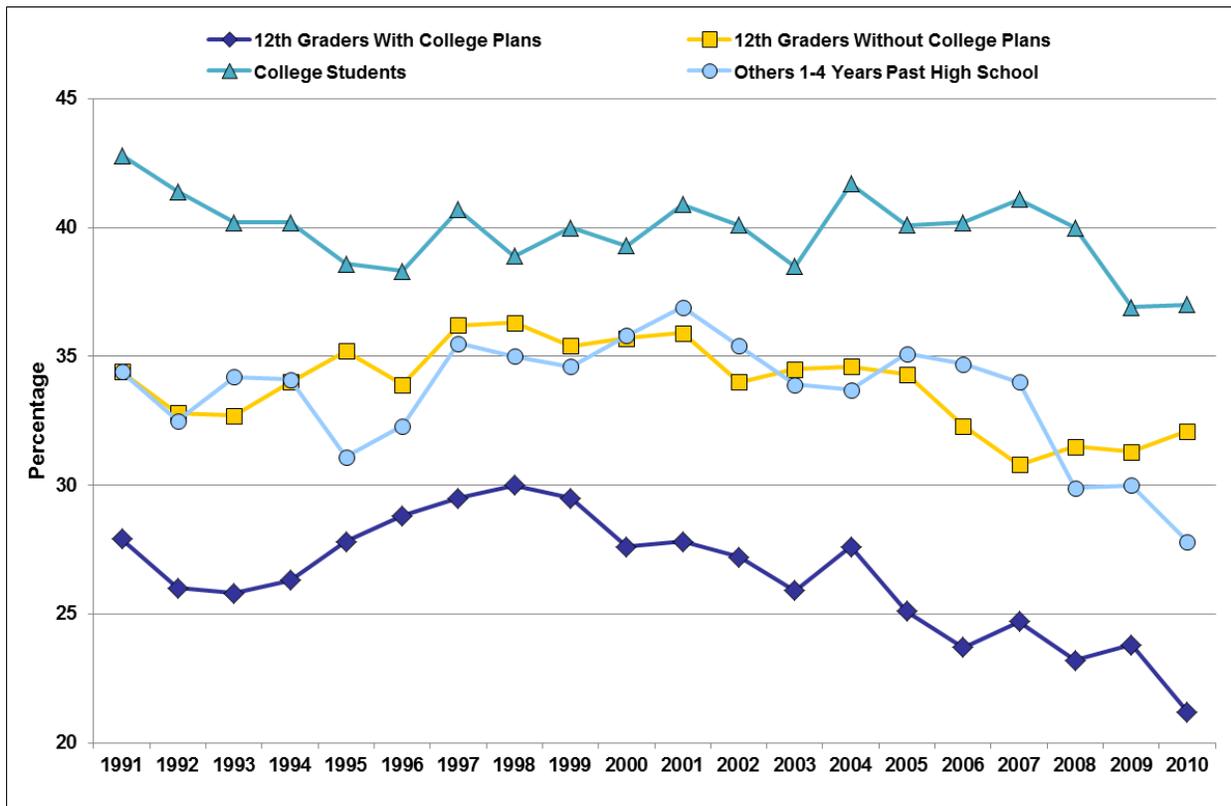


Beverage preferences vary by State. Data from four States indicated that 9th through 12th graders who reported binge drinking were most likely to report drinking liquor (CDC, 2007).

### Alcohol Use in College Is Pervasive and Heavy

Although colleges and universities vary widely in their student binge drinking rates, overall rates of college student drinking and binge drinking exceed those of their age peers who do not attend college (Johnston et al., 2011b). Of college students, 82.3 percent drink and 37.0 percent report drinking five or more drinks on an occasion in the past 2 weeks. Unlike high school students and same age peers not in college, rates of binge drinking among college students have shown little decline since 1993 (Johnston et al., 2011b). These differences are not easily attributable to differences between college attendees and nonattendees. Although college-bound 12th graders are consistently less likely than their non-college-bound counterparts to report occasions of heavy drinking, college students report higher rates of binge drinking than college-age youth who are not attending college (Exhibit 2.14) (Johnston et al., 2011b). This finding suggests that college environments influence drinking practices (Hingson et al., 2002; Kuo, Wechsler, Greenberg, & Lee, 2003).

**Exhibit 2.14: Prevalence of Binge Drinking in the Past 2 Weeks by 12th Graders With and Without College Plans, College Students, and Others 1 to 4 Years Past High School: 1991–2010 (Johnston et al., special runs January 2010, Johnston et al., 2011a,b)**



The consequences of underage drinking in college, discussed in more detail later in this chapter under “Adverse Consequences of College Drinking,” are widespread and serious. Approximately four out of five college students drink alcohol, about two in five engage in binge drinking (defined as five or more drinks in a row for men and four or more in a row for women within the past 2 weeks or 30 days, depending on the survey), and about one in five engages in frequent binging (three or more times in the past 2 weeks) (NIAAA, 2002a). Underage college students consume about 48 percent of the alcohol consumed by students at 4-year colleges (Wechsler et al., 2002). Research shows that some college students far exceed the binge criterion of five drinks per occasion (Wechsler et al., 1999; Wechsler & Nelson, 2008).

### **Alcohol Is Perceived as Readily Available by the Underage Population**

Most teens see alcohol as readily available. In 2010, 61.1 percent of 8th, 80.0 percent of 10th, and 90.4 percent of 12th graders said alcohol would be “fairly easy” or “very easy” to get (Johnston et al., 2011a). Perceived availability, however, has declined in some groups. In 1992, 76.2 percent of 8th graders perceived alcohol as easily available versus 61.1 percent in 2010. For 10th graders, perception of availability peaked in 1996 at 90.4 percent; by 2010, only 80.0 percent held this perception. Data for 12th graders, first collected in 1999, showed 95.0 percent perceiving alcohol to be readily available—a percentage that has remained relatively stable since then.

### **Alcohol Is Available From a Variety of Sources**

Through the STOP Act, Congress required a report on measures of the availability of alcohol from commercial and noncommercial sources to underage populations. The STOP Act also calls for surveillance data on the means of underage access to alcohol. This emphasis reflects findings that alcohol availability and consumption are strongly correlated (Dent, Grube, & Biglan, 2005).

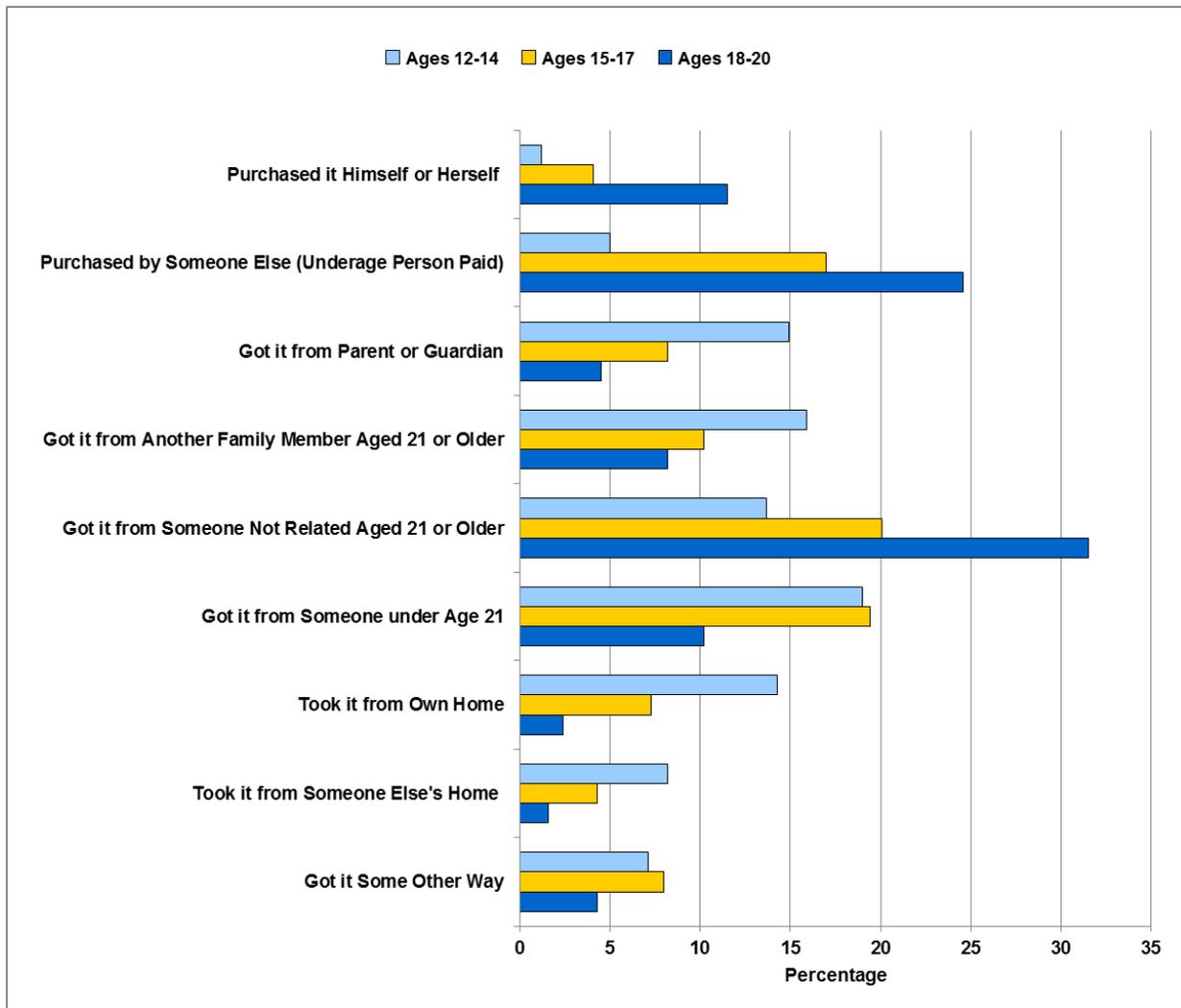
A few small studies show the most frequent means of obtaining alcohol to be parties, friends, adult purchasers (Harrison, Fulkerson, & Park, 2000; Preusser, Ferguson, Williams, & Farmer, 1995; Wagenaar et al., 1996) and, for younger adolescents, family members (NRC, IOM, 2004). The NRC and IOM report notes: “Use of friends under 21 and adult strangers as sources for alcohol appears to increase with age while reports of parents or other family members as sources decrease with age...use of commercial sources appears to be much higher among college students, in urban settings, and where possession and purchase laws are relatively weak or unenforced.”

Before 2006, NSDUH collected data only on the *perception* of alcohol availability by those under 21. In 2006, new items were added to ascertain the *actual* source from which underage drinkers obtained their alcohol. NSDUH divides sources of last alcohol use into two categories: the underage drinker paid (he or she purchased it or gave someone else money to do so) or did not pay (he or she received it for free from someone or took it from his or her own home or someone else’s home). Combined data from 2009 and 2010 show that among all underage current drinkers, 30.4 percent paid for alcohol the last time they drank (8.9 percent purchased the alcohol themselves; 21.4 percent gave money to someone else to do so). Those who paid for alcohol themselves consumed more drinks on their last drinking occasion (average of 5.7 drinks) than those who did not (average of 3.9 drinks). This difference is at least partially explained by the fact that older underage drinkers are more likely to pay for alcohol and to drink more.

Among all underage drinkers, 69.6 percent did not pay for the alcohol the last time they drank. A total of 27.4 percent were given alcohol for free by an unrelated individual age 21 or older, 6.1 percent got the alcohol from a parent or guardian, 9.2 percent got it from another family member age 21 or older, and 4.3 percent took it from their own home.

The most common sources of alcohol varied substantially by age. For youths ages 12 to 14, the most common sources were receiving it free from someone under the age of 21 (19.0 percent), receiving it from another family member age 21 or older (15.9 percent), or receiving it from a parent or guardian (14.9 percent). For youths ages 15 to 17, the most common sources were receiving it from an unrelated person age 21 or older (20.1 percent), receiving it free from someone under age 21 (19.4 percent), and giving somebody else money to purchase the alcohol (17.0 percent). As shown in Exhibit 2.15, among 18- to 20-year-olds, most current drinkers either received alcohol for free from an unrelated person age 21 or older (31.5 percent) or gave somebody else money to purchase the alcohol (24.6 percent) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010).

**Exhibit 2.15: Source of Last Alcohol Used Among Past-Month Alcohol Users Ages 12 to 20, by Age Group: 2009–2010 (SAMHSA, CBHSQ, NSDUH, Special Data Analysis, 2011)**



Older underage persons were more likely to have paid for alcohol themselves on their last drinking occasion: 36.3 percent of 18- to 20-year-olds did so compared with 21.3 percent of 15- to 17-year-olds and 6.2 percent of 12- to 14-year-olds. Male underage drinkers were more likely to have paid for alcohol themselves on their last drinking occasion (36.3 percent) than their female counterparts (23.4 percent) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2011).<sup>14</sup>

## **Exposure of Underage Populations to Messages Regarding Alcohol in Advertising and Entertainment Media**

The STOP Act requires the HHS Secretary to report to Congress on the extent of “the exposure of underage populations to messages regarding alcohol in advertising and the entertainment media as reported by the Federal Trade Commission (FTC).” To date, FTC has conducted three formal studies of the exposure of those under 21 to alcohol advertising. FTC has not conducted any studies that measure alcohol depictions in entertainment media.

### **1999 Alcohol Report**

In 1999, FTC reported that the voluntary codes of the alcohol industry permitted alcohol advertising in media where as little as 50 percent of the audience was of legal age. Only half of the companies studied were able to show that nearly all of their ads reached a majority legal-age audience; the other half either provided data showing that a substantial portion of their ads did not comply with the 50 percent guideline or failed to obtain the data needed to evaluate their code compliance. Noting that the 50 percent standard permitted alcohol advertising to reach large numbers of underage consumers, the FTC recommended that the industry raise the placement standard and measure compliance against reliable up-to-date audience composition data.<sup>15</sup>

### **2003 Alcohol Report**

FTC’s 2003 review reported that over 99 percent of the radio, television, and magazine advertising budgets for alcohol brands whose target audience included 21-year-olds were expended in compliance with the 50 percent placement standard. FTC also announced that the alcohol industry had agreed to amend its voluntary codes to require that adults over 21 constitute at least 70 percent (thus reducing the permissible underage percentage to 30 percent) of the audience for TV, magazine, and radio ads, based on reliable data. To facilitate compliance, the revised codes of the beer and spirits industries required members to conduct periodic post-placement audits and promptly remedy any identified problems.<sup>16</sup>

### **2008 Alcohol Report**

In June 2008, FTC published its third study of alcohol advertising, evaluating compliance with the 70 percent placement standard and other matters relating to underage exposure. Data showed that 92.5 percent of advertising placements complied with the 70 percent standard; furthermore, because placements that missed the target were concentrated in smaller media, more than 97

<sup>14</sup> More detailed information can be found in the special report by Pemberton and colleagues entitled Underage Alcohol Use: Findings from the 2002-2006 National Surveys on Drug Use and Health, available at <http://www.oas.samhsa.gov/underage2k8/underage.pdf>.

<sup>15</sup> For more information, see *Self-Regulation in the Alcohol Industry* (FTC, 1999), available at <http://www.ftc.gov/reports/alcohol/alcoholreport.htm>.

<sup>16</sup> For more information, see *Alcohol Marketing and Advertising* (FTC, 2003), available at <http://www.ftc.gov/os/2003/09/alcohol08report.pdf>.

percent of total alcohol advertising “impressions” (individual exposures to advertising) met the standard. When advertising exposure data were aggregated across companies and measured media, about 86 percent of the alcohol advertising audience consisted of legal-age adults.<sup>17</sup>

### **Youth Drinking Is Correlated With Adult Drinking Practices**

Generational transmission has been widely hypothesized as one factor shaping the alcohol consumption patterns of young people. Whether through genetics, social learning, or cultural values and community norms, researchers have repeatedly found a correlation between youth drinking practices and those of their adult relatives and other community adults (SAMHSA, 2008). Nelson and colleagues (2009) recently demonstrated this relationship at the population (State) level. State estimates of youth and adult current drinking and binge drinking from 1993 through 2005 were significantly correlated when pooled across years. These results suggest that some policies that primarily affect adult drinkers (e.g., pricing and taxation, hours of sale, on-premises drink promotions) may affect underage drinking.

### **Despite Meaningful Progress, Underage Drinking Remains Unacceptably High**

Available data from 1975 to 2010 document that the prevalence of drinking among 12th graders peaked in 1978 for lifetime use and past-year use (Johnston et al., 2011a). Lifetime alcohol use among 12th graders in 2006 showed a statistically significant decline from 2005, dropping from 75.1 percent to 72.7 percent (Johnston, O’Malley, Bachman, & Schulenberg, 2007). Levels of lifetime alcohol use remained steady in 2007, 2008, 2009, and 2010 (Johnston et al., 2009a, 2011a). Past-month use among 12th graders increased between 1975 and 1978, decreased slightly between 1978 and 1988, decreased between 1988 and 1993, increased between 1993 and 1997, and decreased between 1997 and 2002 (Exhibit 2.16) (Johnston et al., 2009a,c).

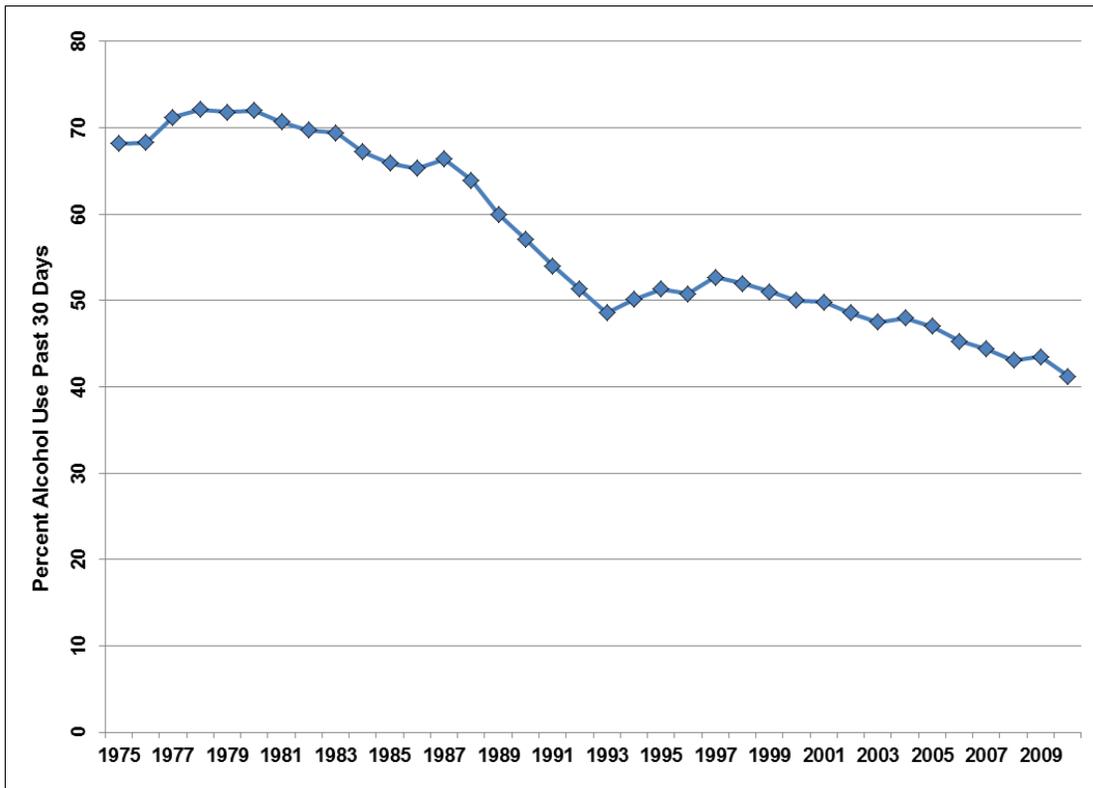
Binge drinking in the past 2 weeks among 12th graders peaked in 1981, held steady in 1982, and then declined from 40.8 percent in 1983 to a low of 27.5 percent in 1993—a decrease of almost one third, and thus a significant improvement (Johnston et al., 2009a). Between 1993 and 1998, binge drinking rose by about 4 percentage points among 12th graders. An upward drift in binge drinking among 8th graders occurred between 1991 (10.9 percent) and 1996 (13.3 percent) and among 10th graders between 1991 (21.0 percent) and 2000 (24.1 percent). After those peaks, a slight decline in binge use occurred in all three grades until 2002, when rates fell appreciably. Since 2002, bingeing has generally continued to decline, but only slightly (Johnston et al., 2011a).

Faden and Fay (2004) examined similar underage drinking data from NSDUH, MTF, and YRBS from 1990 to 2002. Trend analyses “show a pattern of relative stability or decreases in the late 1990s and early 2000s for all groups on all measures with the exception of daily drinking by 10<sup>th</sup> graders in MTF and drinking five or more drinks in a row by 10<sup>th</sup> graders in YRBS” (Faden & Fay, 2004, p. 1393). They continue by saying: “these results considered together offer stronger support for the finding of stability or decrease in youth drinking prevalence in the past 10 years

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<sup>17</sup> For more information, see *Self-Regulation in the Alcohol Industry* (FTC, 2008), available at <http://www.ftc.gov/os/2008/06/080626alcoholreport.pdf>.

**Exhibit 2.16: Trend in 30-Day Prevalence of Alcohol Use for 12th Graders, 1975–2010 (Johnston et al., 2011a)**



or so than results from any one survey do by themselves.” More recent analyses of the same data sources (Chen, Yi, & Faden, 2011) show continued declines in past-month and binge alcohol use through 2009.

These results are encouraging. Meaningful progress is being made. However, as the following sections demonstrate, the consequences of underage drinking remain a substantial threat to public health. From this perspective, the prevalence of alcohol use by persons under age 21 remains unacceptably high.

### **Consequences and Risks of Underage Drinking**

Underage drinking is a problem for individuals and society. Underage drinking is a threat to public health and safety, with profound consequences for youth, their families, and their communities. It also results in enormous economic costs. In 2006, almost \$27 billion (about 12 percent) of the total \$223.5 billion economic costs of excessive alcohol consumption were related to underage drinking. The costs largely resulted from losses in workplace productivity (61 percent of the total cost), law enforcement and other criminal justice expenses related to excessive alcohol consumption (17 percent of the total cost), healthcare expenses for problems caused by excessive drinking (14 percent of the total cost), and motor vehicle crash costs from impaired driving (5 percent of the total cost). Most productivity losses (25 percent) were due to deaths from alcohol-attributable conditions involving underage youth (Bouchery et al., 2011).

Underage drinking is a complex problem that results in a range of adverse short- and long-term consequences. The following sections describe some of these negative consequences, which include the negative effects of alcohol consumption on underage drinkers and consequences for those around them (referred to as secondary effects of underage alcohol use).

### **Alcohol-Related Motor Vehicle Crashes**

According to the *Call to Action*, about 5,000 people under age 21 die annually from alcohol-related injuries involving underage drinking. The greatest mortality risk for underage drinkers is motor vehicle crashes. In 2009, of the 2,336 drivers ages 15 to 20 who were killed in motor vehicle traffic crashes:

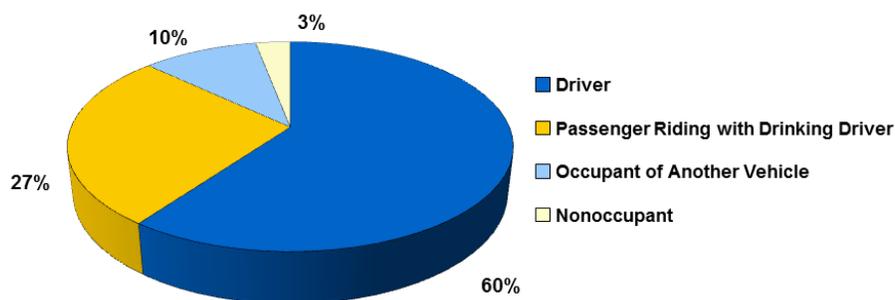
- 771 (33 percent) had a BAC of 0.01 or higher.
- 120 (5 percent of all fatally injured drivers this age) had a BAC of 0.01 to 0.07 g/dL.
- 651 (28 percent of fatally injured drivers this age) had a BAC of 0.08 g/dL or higher (NHTSA FARS, 2009).

In 2009, of the 312 nonoccupants (pedestrians and pedal cyclists) in the 15- to 20-year-old age group killed in motor vehicle traffic crashes, 78 (25 percent) had a BAC of 0.01 g/dL or higher, 18 (6 percent of all nonoccupant fatalities this age) had a BAC of 0.01–0.07 g/dL, and 61 (19 percent of nonoccupant fatalities this age) had a BAC of 0.08 g/dL or higher (NHTSA FARS, 2009).

Relative to adults, young people who drink and drive have an increased risk of alcohol-related crashes because of their relative inexperience behind the wheel and their increased impairment from a given amount of alcohol. One study found that a BAC of 0.08 g/dL rendered adult drivers in all age and gender groups 11 times more likely than sober drivers to die in a single-vehicle crash. In a classic paper, Zador (1991) reported that among 16- to 20-year-olds, a BAC of 0.08 g/dL rendered male drivers 52 times more likely and female drivers 94 times more likely than sober gender-matched drivers the same age to die in a single-vehicle fatal crash.

The distribution of fatalities in motor vehicle traffic crashes involving a 15- to 20-year-old driver with a BAC of 0.08 g/dL or higher by person type in 2009 is shown in Exhibit 2.17.

**Exhibit 2.17: Distribution of Fatalities in Motor Vehicle Traffic Crashes Involving a 15- to 20-Year-Old Driver with a BAC of 0.08 or Higher by Person Type in 2009 (NHTSA FARS, 2009)**



According to 2010 survey data, about 4.1 percent of 16-year-olds, 7.6 percent of 17-year-olds, 11.9 percent of 18-year-olds, 15.0 percent of 19-year-olds, and 18.5 percent of 20-year-olds reported driving under the influence of alcohol at least once in the past year (SAMHSA, detailed tables, 2011b). In general, the reported prevalence of driving under the influence of alcohol increases with age until about age 25, although there is some variation among survey years. For example, according to the 2010 NSDUH data, prevalence of driving under the influence of alcohol peaked at age 22, then declined for older persons. Overall, 28.3 percent of high school students in the 2009 YRBS had, in the past 30 days, ridden with a driver who had been drinking; 28.2 percent of seniors had done so (Eaton et al., 2010).

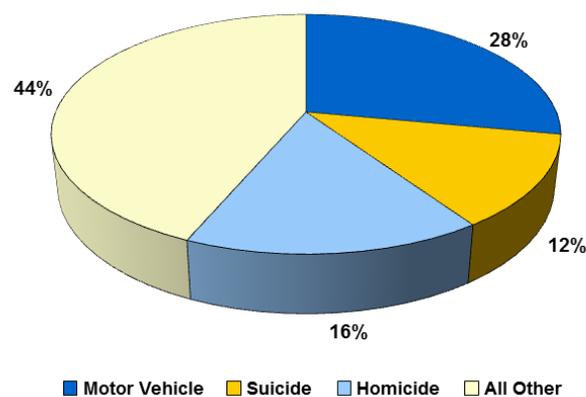
### **Other Unintentional Injuries Such as Burns, Falls, and Drownings**

In addition to motor vehicle crashes, underage drinking contributes to all major causes of fatal and nonfatal trauma experienced by young people (Exhibit 2.18). In 2008, 2,270 individuals ages 16 to 20 died from unintentional injuries other than motor vehicle crashes, such as poisoning, drowning, falls, burns, and so forth (CDC, 2011). Research suggests that approximately 40 percent of these deaths were alcohol attributable (Smith, Branas, & Miller, 1999).

### **Suicide, Homicide, and Violence**

In 2008, 2,930 people ages 12 to 20 died from homicide; 2,286 died from suicide (CDC, 2011). At present, it is unknown how many of these deaths are alcohol related. One study (Smith et al., 1999) estimated that, for the population as a whole, nearly a third (31.5 percent) of homicides and almost a quarter (22.7 percent) of suicides were alcohol attributable (i.e., involved a decedent with a BAC of 0.10 g/dL or greater). Another study of deaths among those under 21 reported that 12 percent of male suicides and 8 percent of female suicides were alcohol related (Levy, Miller & Cox, 1999). Individuals under age 21 commit 45 percent of rapes, 44 percent of robberies, and 37 percent of other assaults (Levy et al., 1999). However, the degree to which violent crimes committed by those under 21 are alcohol related remains to be determined.

**Exhibit 2.18: Leading Causes of Death for Youth Ages 12–20: 2008 (CDC WISQARS, 2011)<sup>18</sup>**



<sup>18</sup> CDC's Web-based Injury Statistics Query and Reporting System (WISQARS) is an interactive database system that provides customized reports of injury-related data.

### **Years of Potential Life Lost Due to Alcohol**

Approximately 30 years of potential life are lost for persons with an alcohol-attributable death across all age groups (CDC, 2004). By comparison, each person who dies from cancer loses an average of 15 years of life, and each person who dies from heart disease loses an average of 11 years of life (Ries et al., 2003). Persons under age 21 who die as a result of alcohol use lose an average of 60 years of potential life (CDC, 2011).

### **Risky Sexual Activity**

According to the Surgeon General's *Call to Action*, underage drinking plays a significant role in risky sexual behavior, including unwanted, unintended, and unprotected sexual activity, as well as sex with multiple partners. Such behavior increases the risk for unplanned pregnancy and for contracting sexually transmitted diseases (STDs), including infection with HIV, the virus that causes AIDS (Cooper & Orcutt, 1997). When pregnancies occur, underage drinking may result in fetal alcohol spectrum disorders (FASDs), including fetal alcohol syndrome, which remains a leading cause of mental retardation (Warren & Bast, 1988; Stratton, Howe, & Battaglia, 1996; Jones, Smith, Ulleland, & Streissguth, 1973). Underage drinking by both victim and assailant increases the risk of physical and sexual assault (Hingson et al., 2005; Nolen-Hoeksema, 2004). These risks are of particular concern given the increasing rates of heavy drinking among girls.

### **Adverse Consequences of College Drinking**

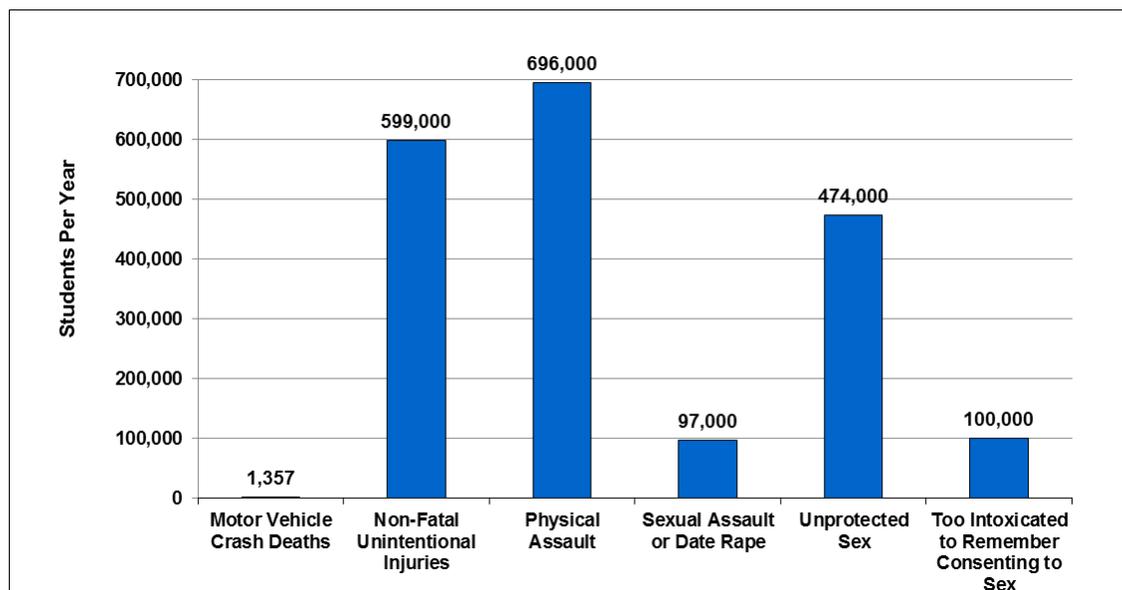
An estimated 90 percent of college rapes involve use of alcohol by the assailant, the victim, or both (Commission on Substance Abuse at Colleges and Universities, 1994). About 97,000 college students are victims of sexual assault or date rape related to alcohol use each year (Hingson et al., 2009). Alcohol use is involved in 95 percent of all violent crime on college campuses (Commission on Substance Abuse at Colleges and Universities, 1994).

Many other adverse social consequences are linked with college alcohol consumption. It is estimated that more than 696,000 college students were assaulted or hit by another student who had been drinking; another 500,000 were unintentionally injured while under the influence of alcohol (Hingson et al., 2009). Research suggests that roughly 400,000 students between the ages of 18 and 24 had unprotected sex due to drinking, and each year more than 100,000 students between the ages of 18 and 24 report having been too intoxicated to know if they consented to having sex (Exhibit 2.19). Approximately 25 percent of college students report academic consequences that occur as a result of their drinking, including missing class, falling behind, doing poorly on exams or papers, and receiving lower grades overall. About 11 percent of college student drinkers report having damaged property while under the influence of alcohol (Hingson et al., 2005).

### **Potential Brain Impairment**

Adverse effects on normal brain development are a potential long-term risk of underage alcohol consumption. Neurobiological research suggests that adolescence may be a period of unique vulnerability to the effects of alcohol. For example, early heavy alcohol use may have negative effects on the actual physical development of the brain structure of adolescents (Brown & Tapert, 2004), as well as on brain functioning. Negative effects indicated by neuropsychological studies include decreased ability in planning, executive functioning, memory, spatial operations,

**Exhibit 2.19: Prevalence of Alcohol-Related Morbidity and Mortality Among College Students Ages 18–24 (Hingston et al., 2002, 2005, 2009)**



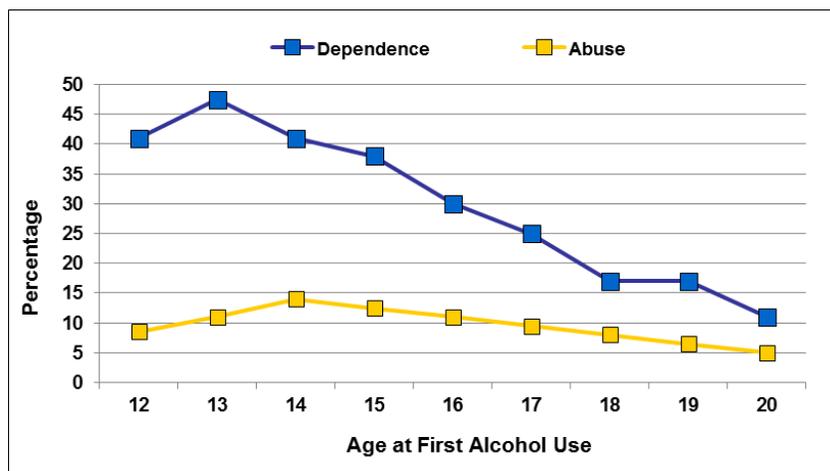
and attention, all of which play important roles in academic performance and future levels of functioning (Giancola & Mezzich, 2000; Brown, Tapert, Granholm, & Dellis, 2000; Tapert & Brown, 1999; Tapert et al., 2001). As Brown and colleagues (2000) note, these deficits may put alcohol-dependent adolescents at risk for falling farther behind in school, putting them at an even greater disadvantage relative to nonusers. Some of these cross-sectional findings have been supported by recent longitudinal analyses (Squeglia, Jacobus, & Tapert, 2009).

### **Impaired Academic Performance**

It has been known for decades that underage drinking affects academic performance. According to the 2009 YRBSS, of the 1 million high school students who binged at least five times per month, one third did so on school property. Binge drinkers were also three times more likely to report earning mostly Ds and Fs on their report cards compared to non-binge drinkers (Eaton et al., 2010; Miller, Naimi, Brewer, & Jones, 2007).

### **Increased Risk of Developing an Alcohol Use Disorder Later in Life**

Early-onset alcohol use (14 or younger), alone and in combination with escalated drinking in adolescence, has been noted in several studies as a risk factor for the development of alcohol-related problems in adulthood (Agrawal et al., 2009; Grant & Dawson, 1997; Gruber, DiClemente, Anderson, & Lodico, 1996; Hawkins et al., 1997; Schulenburg, O'Malley, Bachman, Wadsworth, & Johnston, 1996; York, Welte, Hirsch, Hoffman, & Barnes, 2004). Grant and Dawson (1997) found that more than 40 percent of persons who initiated drinking before age 13 met diagnostic criteria for alcohol dependence at some time in their lives. By contrast, alcohol dependence rates among those who started drinking at ages 17 and 18 were 24.5 percent and 16.6 percent, respectively (Exhibit 2.20). Only 10 to 11 percent who started at age 21 or older met the criteria.

**Exhibit 2.20: Ages of Initiation and Levels of DSM Diagnoses for Abuse and Dependence (Grant & Dawson, 1997)**

The onset of alcohol consumption in childhood or early adolescence is a marker for later alcohol-related problems, including heavier adolescent use of alcohol and other drugs (Robins & Przybeck, 1985; Hawkins et al., 1997). Adults who started drinking at age 14 were three times more likely to report driving after drinking too much ever in their lives than were those who began drinking after age 21. Crashes were four times as likely for those who began drinking at age 14 as for those who began drinking after age 21 (Hingson, Heeren, Levenson, Jamanka, & Voas, 2001). Children of parents who binge are twice as likely to binge themselves and to meet alcohol dependence criteria.