

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 in an average of approximately 4,700 deaths among underage youths in the United States every year, shortening their lives by an average of 60 years (CDC, 2009b).

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. Alcohol accounts for more deaths than all other illicit drugs combined for those under 21 years of age. Nevertheless, a lack of public recognition of the sometimes devastating consequences of underage alcohol use and its personal, economic, and social costs hampers implementation of a comprehensive prevention effort.

Still, there is reason 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 death and disability and associated health care costs. These efforts also make potential reductions in underage drinking and its consequences and a change in the norms that support underage drinking in American communities.

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 of 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); the National Health Interview Survey (NHIS); and the 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

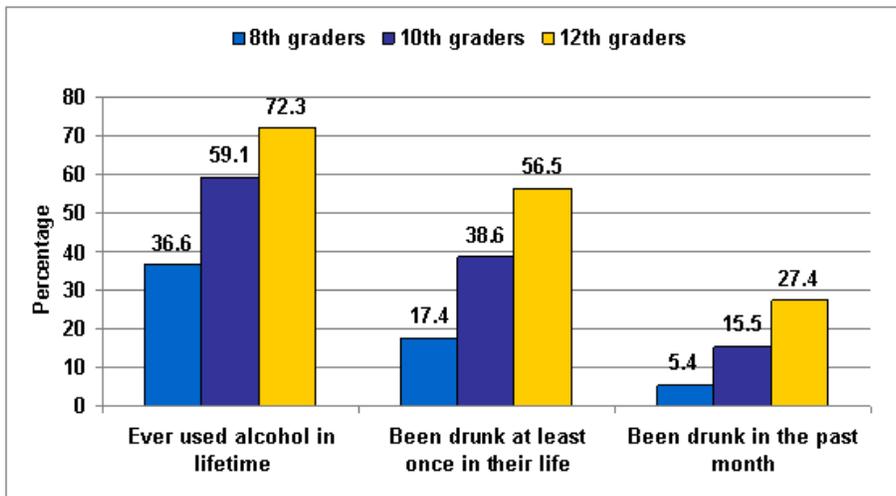
Underage alcohol use in America is a widespread and serious problem:

- *Current Use:* The 2009 NSDUH reported that approximately 27.2 percent of Americans ages 12 through 20 (about 10.4 million people) reported having at least one drink in the 30 days prior to the survey. Of this age group, 18.1 percent (6.9 million) were binge drinkers (5 or more drinks on the same occasion, i.e., at the same time or within a couple of hours) on at least 1 day in the past 30 days. 5.4 percent of this age group (2.1 million) were heavy drinkers (5 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 (SAMHSA, 2010).
- *Lifetime Use:* MTF 2009 showed that 72.3 percent of 12th, 59.1 percent of 10th, and 36.6 percent of 8th graders have had alcohol at some point in their lives¹⁰ (Figure 2.1; Johnston et al., 2009c).
- *Binge Use:* The 2009 NSDUH showed 4.3 percent of 14-year-olds, 13.1 percent of 16-year-olds, 30.4 percent of 18-year-olds, and 38.9 percent of 20-year-olds to have engaged in binge drinking within the past 30 days (SAMHSA, 2010).
- *Heavy Use:* NSDUH 2009 showed that 2.8 percent of 16-year-olds, 8.1 percent of 18-year-olds, and 13.6 percent of 20-year-olds had consumed alcohol heavily in the past 30 days (SAMHSA, 2010).
- *Use to Intoxication:* In MTF 2009, 56.5 percent of 12th, 38.6 percent of 10th, and 17.4 percent of 8th graders reported having been drunk¹¹ at least once (Johnston et al., 2009c).
- *Past-Month Intoxication:* In MTF 2009, 27.4 percent of 12th, 15.5 percent of 10th, and 5.4 percent of 8th graders reported being drunk in the past month. (Johnston et al., 2009c).

¹⁰ Lifetime alcohol use in this survey is defined as “having more than a few sips.”

¹¹ MTF asks “On how many occasions (if any) have you been drunk or very high during the past 30 days?”

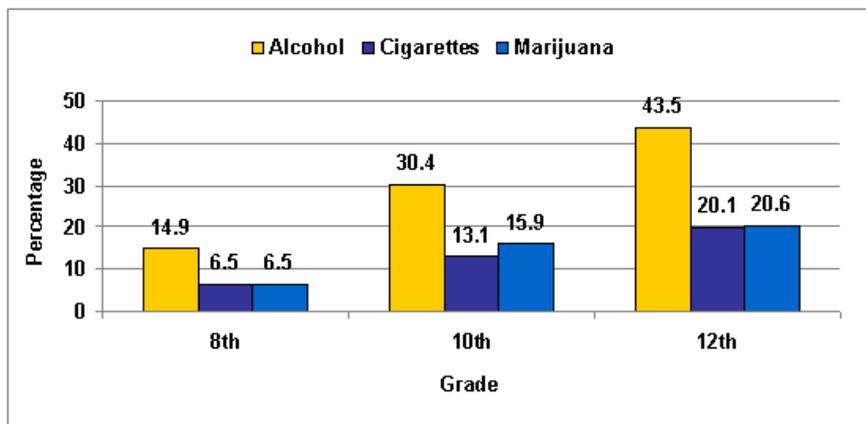
Figure 2.1 – Lifetime Alcohol Use, Use to Intoxication, and Use to Intoxication Within the Last Month Among 8th, 10th, and 12th Graders (Johnston, et al., 2009c)



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

As indicated in Figure 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., 2009c).

Figure 2.2 – Past-Month Adolescent Alcohol, Cigarette, and Marijuana Use by Grade (Johnston et al., 2009c)



Youth Start Drinking at an Early Age

Drinking often begins at very young ages.¹² Recent surveys indicate that approximately:

- Ten percent of 9- to 10-year-olds have already started drinking¹³ (Donovan et al., 2004).
- More than one fifth of underage drinkers begin drinking before age 13 (Eaton et al., 2008).
- Peak years of initiation are 7th through 11th grades, based on data from high school seniors (Johnston et al., 2009a).

In fact, an estimated 2,842 young people ages 12 to 14 years initiated alcohol use per day in 2009 (SAMHSA, 2010). This translates into slightly more than 1 million (1,038,000) youth under 15 years old initiating alcohol use each year. Youth who report drinking prior to the age of 15 are more likely to develop problems including intentional and unintentional injury to self and others after drinking (Hingson and Zha, 2009; Hingson et al., 2000); violent behavior, including predatory violence and date violence (Blitstein et al., 2005; Ellickson et al., 2003; Ramisetty-Milker, 2006); criminal behavior (Eaton et al., 2007); prescription drug misuse (Hermos et al., 2008); unplanned and unprotected sex (Hingson et al., 2003); motor vehicle crashes (Hingson et al., 2002); and physical fights (Hingson et al., 2001). Early-onset drinking is thus a marker for future problems, including heavier use of alcohol and other drugs during adolescence (Robins and Przybeck, 1985; Hawkins et al., 1997) and alcohol dependence in adulthood (Grant and 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.

NSDUH data indicate that the average age of first-time users of alcohol declined from 17.3 years to 16.2 years between 1965 and 2003 (SAMHSA, 2005). MTF data shows that the proportion of 8th, 10th, and 12th graders who had ever used alcohol and the proportion of those who started using alcohol prior to 7th grade generally declined from 1998 to 2009, suggesting a possible increase in the age at first use (Johnston et al., 2009a; Johnston, personal communication, 2010).

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 methodology, 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 2003 and 2005, but show an increase to 15.8 years in 2006—a statistically significant difference from 2004 and 2005 (SAMHSA, 2007). The average 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; SAMHSA, CBHSQ, NSDUH, special data analysis, 2010). 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), and 17.1 in 2009 (SAMHSA, 2010). Appendix A further discusses methodological issues in measuring age at first use and other indicators of alcohol initiation.

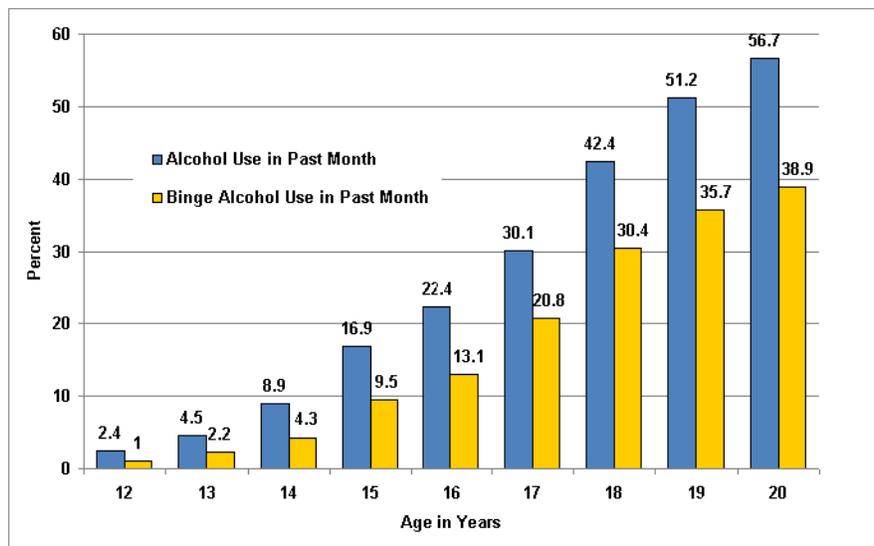
¹² “Age of first use” is the age at which drinking begins. Drinking is defined as the consumption of at least one drink (e.g., a bottle of beer, glass of wine, shot of liquor, or mixed drink) but not having “a sip or two from a drink.”

¹³ Drinking is defined as having more than a few sips.

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

Drinking becomes increasingly common through the teenage years (O'Malley et al., 1998). Frequent, heavy use by underage drinkers also increases each year from the age of 12 to the age of 20 (Flewelling et al., 2004). The 2009 NSDUH reports that underage alcohol consumption in the past month increased with age in a steady progression from 2.4 percent for 12-year-olds to 56.7 percent for 20-year-olds and peaked at 71.6 percent for 22-year-olds (SAMHSA, 2010). As shown in Figure 2.3, binge drinking also increased steadily between the ages of 12 and 20, peaking at age 22 (50.5 percent) and then decreasing beyond young adulthood (data not shown; SAMHSA, 2010). Approximately 6.9 million (18.1 percent) of 12- to 20-year-olds reported past-month binge alcohol use (SAMHSA, 2010).

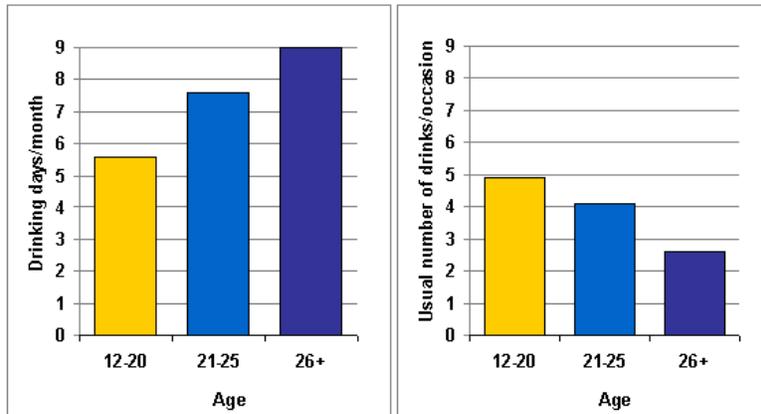
Figure 2.3 – Current and Binge Alcohol Use Among Persons Aged 12 to 20 by Age: 2009 (SAMHSA, 2010)



Youth Binge More and Drink More Than Adults When They Drink

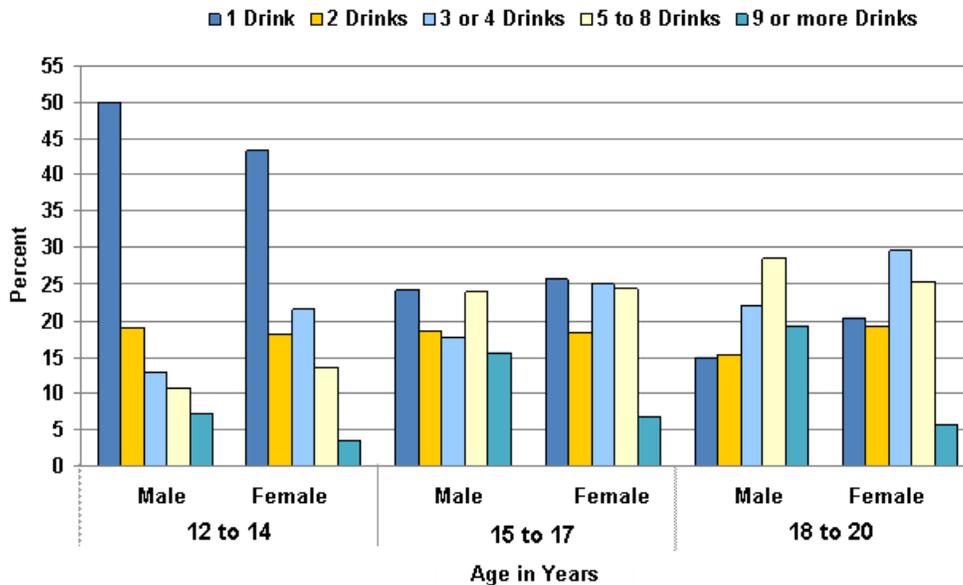
Young drinkers tend to drink less often than adults, but they drink more heavily when they do drink. For example, 92 percent of the alcohol consumed by 12- to 14-year-olds is via binge drinking (Pacific Institute for Research and Evaluation [PIRE], 2002). Underage drinkers consume, on average, about 6 drinks per occasion, about 5 times a month (SAMHSA, 2010), whereas adult drinkers 26 and older average 3 drinks per occasion, about 9 times a month (Figure 2.4) (SAMHSA, 2010). It is important to note that very young adolescents, because of their smaller size, reach BACs achieved by binge drinking by older adolescents (e.g., age 18 or older) with fewer drinks (3-4 drinks for persons ages 12-15) (Donovan, 2009).

Figure 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)2009 (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010)



When asked about the number of drinks consumed on their last occasion of alcohol use in the past month, 21.2 percent of underage drinkers reported 1 drink; 17.6 percent, 2 drinks; 23.8 percent, 3 or 4 drinks; 25.3 percent, 5 to 8 drinks; and 12.1 percent, 9 or more drinks for 2008 and 2009 combined (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010). The number of drinks consumed differs by gender (Figure 2.5); underage females are more likely to report consuming 1 to 4 drinks; underage males, consuming 5 to 9 drinks or more. The number of drinks reported on the last occasion tends to increase with increasing age.

Figure 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: 2008-2009 (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010)



Particularly worrisome is the high prevalence among underage drinkers of binge drinking, which MTF defines as 5 or more drinks in a row in the past 2 weeks. In 2009, 7.8 percent of 8th, 17.5 percent of 10th, and 25.2 percent of 12th graders reported heavy episodic drinking (Johnston, personal communication, 2010). In 2009, about 2.1 million youth ages 12 through 20 (5.4 percent) drank 5 or more drinks on a single occasion¹⁴ 5 or more times a month (SAMHSA, 2010).

Faden and Fay (2004) used sophisticated statistical trend analyses to examine underage drinking data from 1975 to 2002. Among 12th graders, drinking 5 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 5 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 and Fay, 2004).

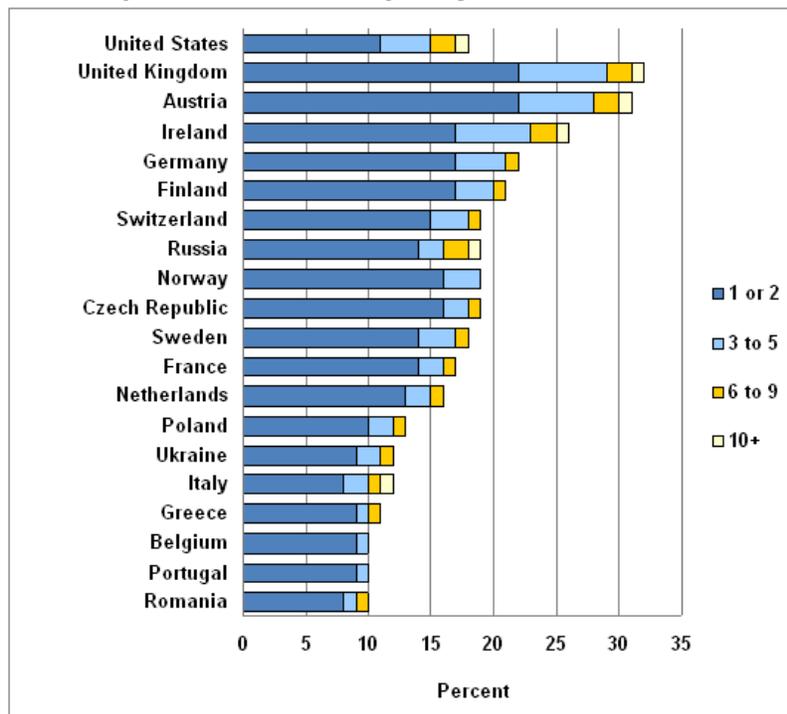
Information on the prevalence of drinking 5 or more drinks in a row in the past 2 weeks among 8th and 10th graders first became available in 1991. In 1991, 12.9 percent of 8th and 22.9 percent of 10th graders reported engaging in this behavior compared with 11.4 percent and 22.0 percent, respectively, 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 et al., 2005). Visual examination of 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 (Figure 2.6).

¹⁴ If a typical 160-pound male drinks five standard drinks over a 2-hour period, he would reach a blood alcohol content (BAC) of .08, making him legally intoxicated in all 50 States.

Figure 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)



*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)?”

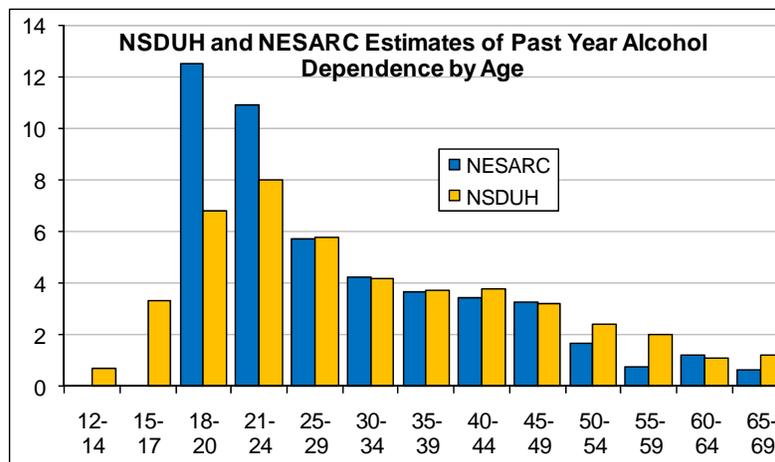
In all countries listed in Figure 2.6, the minimum legal drinking age is lower than in the United States. These data call into question the suggestion that having a lower minimum legal drinking age results in less problem drinking by adolescents.

There Is a High Prevalence of Alcohol Use Disorders Among the Young

Two large nationally representative data sets provide information on the prevalence of alcohol abuse and dependence among persons under 21 years of age—NSDUH for youth ages 12 to 20 and NESARC for youth ages 18 to 20. Both surveys indicate that the prevalence of alcohol abuse or dependence among 18- to 20-year-olds is quite high: 16.7 percent according to NSDUH data averaged for 2005 and 2006 and 18.3 percent according NESARC data from 2001 to 2002. For 12- to 17-year-olds, the prevalence of alcohol abuse or dependence is 5.5 percent (SAMHSA, OAS, special analyses of the 2001-2002 NESARC and 2005-2006 NSDUH).

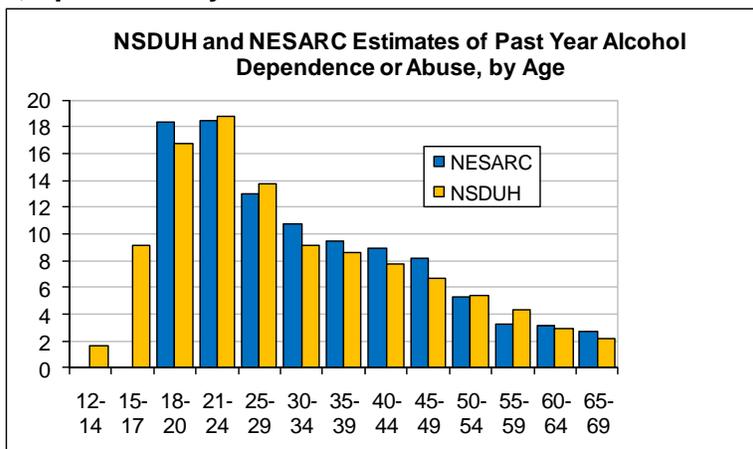
The surveys' findings sometimes differ (Figures 2.7, 2.8), particularly for dependence among 18- to 24-year-olds. These differences are likely due, in part, to differing methodologies and to the use of criteria meant for adults to measure alcohol abuse and dependence in younger drinkers. Because the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (APA, 2000) criteria for abuse and dependence were originally developed for use with adults, using them to assess abuse and dependence in adolescents may lead to inconsistencies.¹⁵

Figure 2.7 – Prevalence of Past-Year DSM-IV Alcohol Dependence by Age (SAMHSA, OAS, Special Analyses of the 2001-2002 NESARC and 2005-2006 NSDUH)



¹⁵ A number of researchers are actively investigating this important issue (Martin et al., 2006; Caetano and Babor, 2006; Chung and Martin, 2005, Wagner, et al., 2002). In addition, the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) Underage Drinking Research Initiative held a meeting of experts to discuss the diagnosis of alcohol abuse and dependence among adolescents in April 2006. APA is also addressing the appropriateness of the current DSM-IV criteria for measuring alcohol abuse and dependence in the young as it prepares for DSM-V.

Figure 2.8 – Prevalence of Past-Year DSM-IV Alcohol Dependence or Abuse by Age (SAMHSA, OAS, Special Analysis of the 2001-2002 NESARC and 2005-2006 NSDUH)



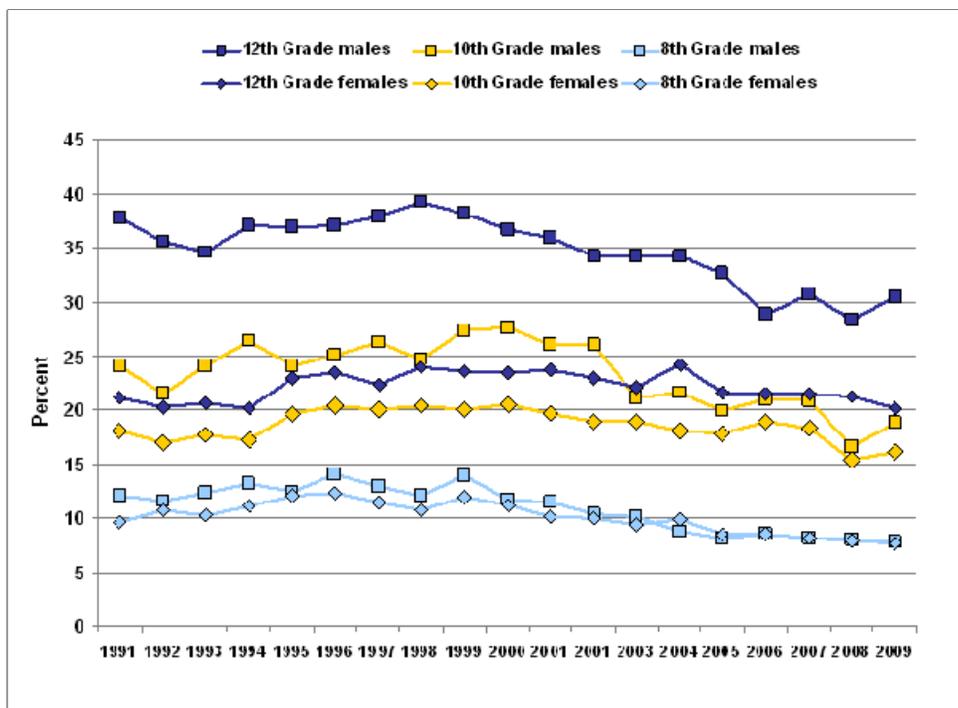
Underage Drinking Differs by Gender

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. In the 2009 NSDUH, 57.6 percent of males ages 12 and older were current drinkers compared with 46.9 percent of females in that age group. However, among underage drinkers, gender differences vary 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 report 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 2009, 30.5 percent of male 12th graders reported binge drinking (having 5 or more drinks in a row) at least once in the prior 2-week period, whereas 20.2 percent of female 12th graders did (Johnston, personal communication, 2010). However, the gap is closing. In 1975, there was a 23 percentage point spread between the rates; 2009, it was 10.3 points (Johnston, personal communication, 2010).

Female bingeing rates are comparable to males among younger age groups, whereas male bingeing rates increase more rapidly with age. NSDUH 2009 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 reports similar results. Among 8th graders, females began steadily gaining on males' bingeing rates in 1991, with equal rates for both genders since 2004 (Figure 2.9) (Johnston et al., 2009c, Johnston, personal communication, 2010).

Figure 2.9 – Rates of Binge Drinking in the Past 2 Weeks Among Male and Female 8th, 10th, and 12th Graders, 1991-2009 (Johnston et al., 2009c; Johnston, personal communication, 2010)



Underage Drinking by Race and Ethnicity

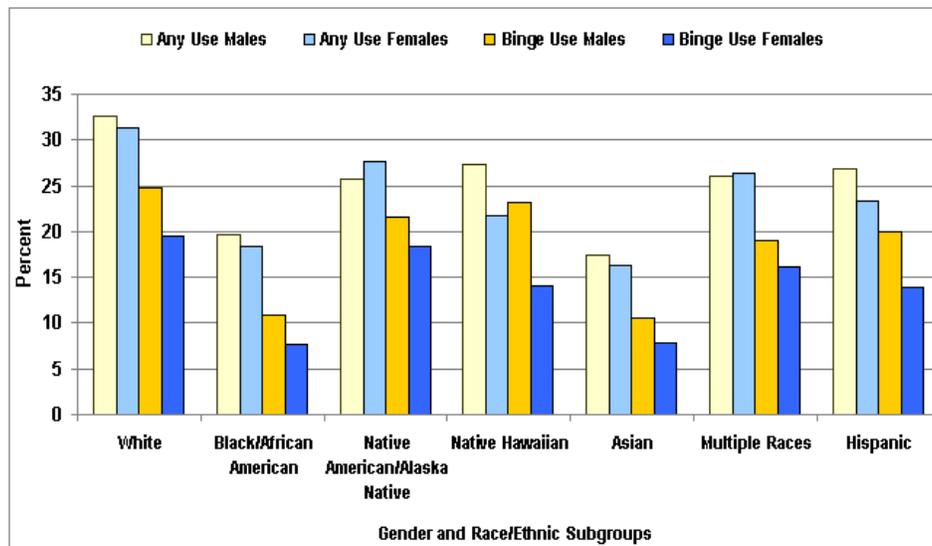
Using NSDUH data¹⁶, from 2002-2009, Whites ages 12 to 20 were more likely to report current use of alcohol than any other race or ethnic group. An estimated 32.6 percent of White males and 31.3 percent of White females reported past-month use, followed by American Indian or Alaska Native females (27.7 percent), Native Hawaiian or Other Pacific Islander males 27.3 percent), Hispanic males (26.8 percent), females of multiple races (26.3), males of multiple races (26.1 percent), American Indian or Alaska Native males (25.7 percent), Hispanic females (23.3 percent), Native Hawaiian or Other Pacific Islander females (21.7 percent) Black or African American males (19.6 percent), Black or African American females (18.3 percent), Asian males (17.5 percent), and Asian females (16.3 percent). As shown in Figure 2.10, among most race/ethnic groups, males and females reported similar rates of current alcohol use; however, among Hispanics and Native Hawaiian or Other Pacific Islanders, males ages 12 to 20 were more likely to report current use than females (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010). Although fewer Blacks report current drinking, data from the 2007 YRBS suggest that the prevalence of alcohol use before the age of 13 is greater among Black (26.7 percent) and Hispanic students (29.0 percent) students than among White students (21.5 percent) (Eaton et al., 2008). 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 of multiple races.

¹⁶ 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.

Multiyear NSDUH data (2002-2009) show that White males ages 12 to 20 were most likely to report binge alcohol use in the past month. An estimated 24.7 percent of White males reported having 5 or more drinks on the same occasion on at least one day within the past 30 days, followed closely by Native Hawaiian or Other Pacific Islander males (23.2 percent) and American Indian or Alaska Native males (21.6 percent). Hispanic males (19.9 percent), White females (19.5 percent), males of multiple races (19.0 percent), and American Indian or Alaska Native females (18.4 percent) reported similar rates of binge drinking followed by females of multiple races (16.2 percent), Native Hawaiian or Other Pacific Islander females (14.1 percent), and Hispanic females (13.9). Black and Asian youth ages 12 to 20 were least likely to report binge drinking with 10.8 percent of Black males, 10.5 percent of Asian males, 7.9 percent of Asian females, and 7.7 percent of Black females reporting the behavior. As shown in Figure 2.10, 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 23.2 percent vs. females 14.1 percent) and Hispanics (males 19.9 percent vs. females 13.9 percent) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010).

These ethnic and racial differences must be viewed with some caution. As Caetano and colleagues (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.

Figure 2.10 –Alcohol Use and Binge Drinking in the Past Month Among Persons Aged 12 to 20 By Race/Ethnicity and Gender, Annual Averages Based on 2002-2009 Data (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010),



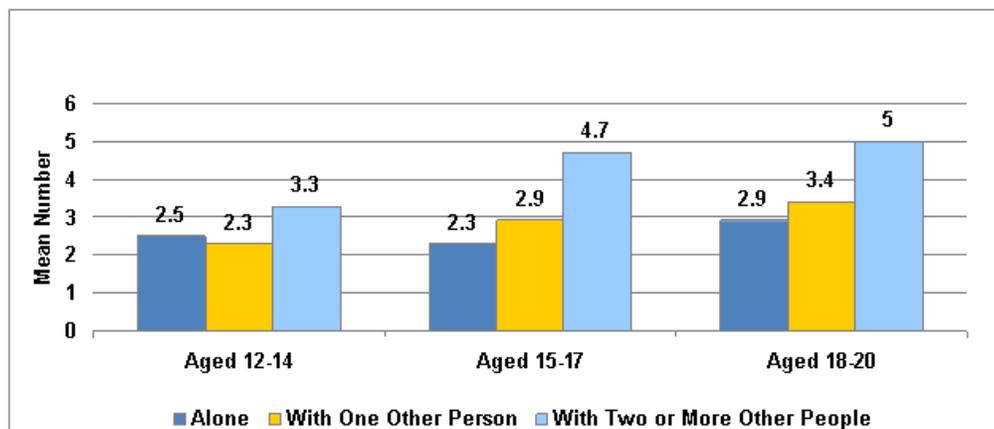
Social Context of Alcohol Use

NSDUH began to collect data on the social context of last alcohol use in 2006. In the following section of this Report, data for 2008 and 2009 have been combined. Most (81.6 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, 13.5 percent were with one other person the last time they drank, and 4.9 percent were alone. Underage persons who drank with two or more others 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 (3.2 drinks) or drank alone (2.7 drinks) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010; Pemberton et al., 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 (8.6 percent) or with one other person (21.3 percent) the last time they drank compared with youths ages 15 to 17 (5.7 percent alone and 13.6 percent with one other person) or 18- to 20-year-olds (4.2 percent alone and 12.7 percent with one other person) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010). 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 (Figure 2.11).

Gender, too, interacts with social context in terms of 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 (82.8 percent) than were male drinkers (80.5 percent). On the other hand, male drinkers were more likely to have been alone the last time they drank (6.2 percent) than were female drinkers (3.5 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 (3.2). 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 (2.9) and drinking with one other person (3.5) was not statistically significant. Males consumed more drinks than females regardless of the social context; for example, when the last drinking occasion was with two or more other people, males averaged 5.6 drinks, compared with 4.0 drinks for females (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010).

Figure 2.11 – 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, 2008-2009 (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010)



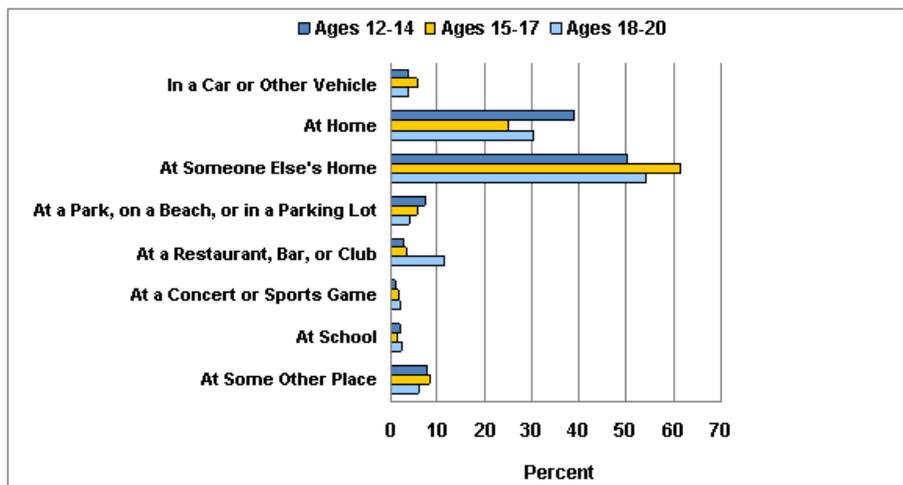
Location of Alcohol Use

NSDUH began to collect data on location of last alcohol use in 2006. The following discussion combines data for 2008 and 2009. Most underage drinkers reported last using alcohol in someone else’s home (56.1 percent, averaging 5.0 drinks) or their own home (29.4 percent, averaging 4.0 drinks). The next most popular drinking locations were at a restaurant, bar, or club (8.6 percent, averaging 4.7 drinks); at a park, on a beach, or in a parking lot (4.6 percent, averaging 5.1 drinks); or in a car or other vehicle (4.1 percent, averaging 5.1 drinks). Current drinkers ages 12 to 20 who last drank at a concert or sports game (1.9 percent of all underage drinkers) consumed an average of 6.4 drinks (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010). Thus, most young people are drinking 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 NSDUH, 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 (38.9 percent) than older adolescents (25.1 percent for 15- to 17-year-olds and 30.4 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 (50.2 percent) than the older age groups (61.3 percent for 15- to 17-year-olds and 54.3 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 (11.5 percent for those ages 18 to 20 versus 2.5 percent for those ages 12 to 14 and 3.2 percent for those ages 15 to 17) (Figure 2.12) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010). 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 (10.4 percent versus 7.0 percent).

Figure 2.12 – Drinking Location by Age Group, 2008-2009 (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010)



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 et. al., 1998). Similar findings exist for college student binge drinking (Clapp et. al., 2000).

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.

Table 2.1, based on 2009 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).

Table 2.1 – Past-Month Underage Alcohol Use by Category (Johnston, personal communication, 2010)

Grade	Beer	Wine	Wine Coolers	Spirits	Flavored Alcoholic Beverages
8 th	10.0%	n/c	n/c	n/c	9.5%
10 th	22.6%	n/c	n/c	n/c	19.0%
12 th	34.9%	11.5%	12.2%	33.2%	27.4%

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 prior to the survey, some percent 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 2009, the gap in preferences had nearly disappeared, as shown in Table 2.1.

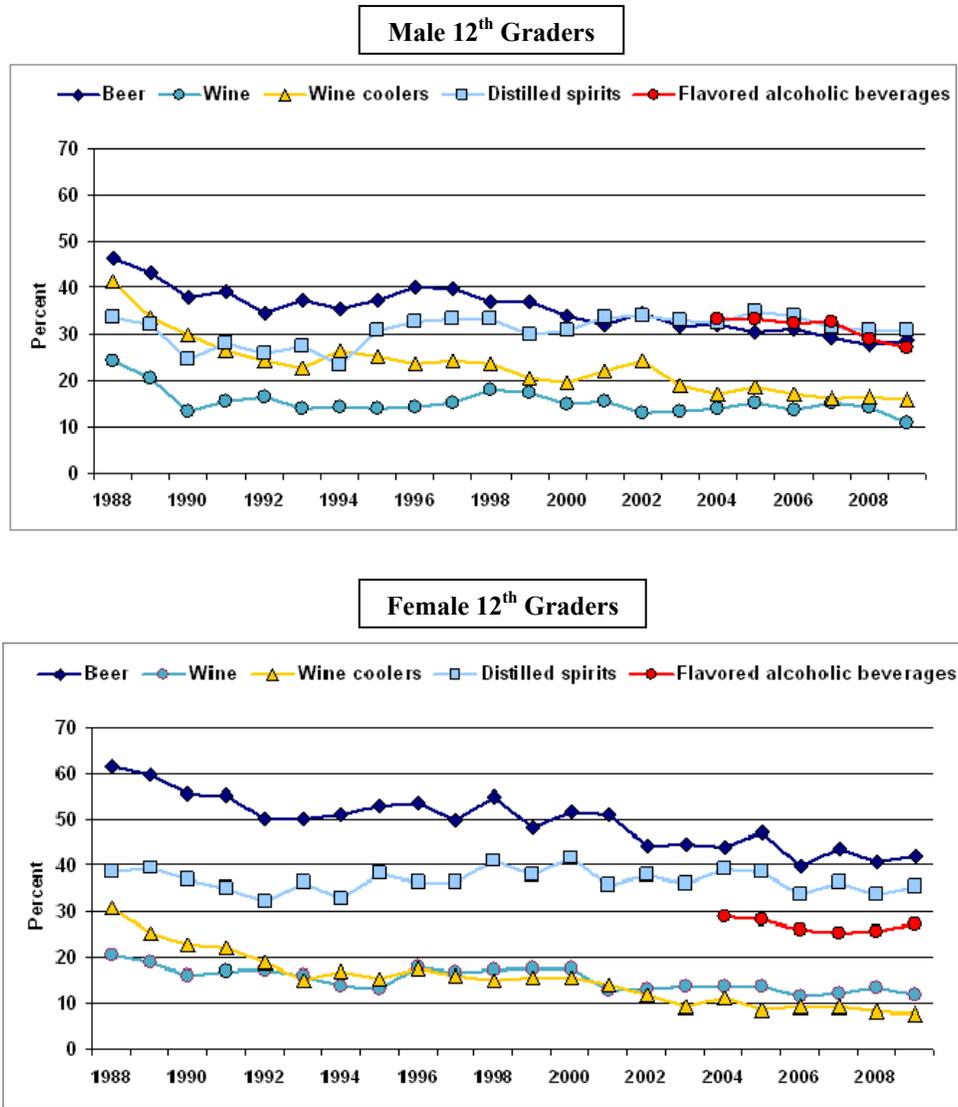
Figure 2.13 shows that females, in particular, have shifted their beverage preference from beer to distilled spirits and FABs. In 1988, 46.3 percent of 12th grade females reported consuming beer compared with 33.6 percent reporting distilled spirits consumption. By 2009, the preference had shifted, with distilled spirits consumption remaining steady at 30.9 percent and beer consumption dropping to 28.7 percent. MTF data show that females have been more likely to prefer FABs than males since 2004 (Johnston et al., 2009a, Johnston, personal communication, 2010).

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

Alcohol Use in College Is Pervasive and Heavy

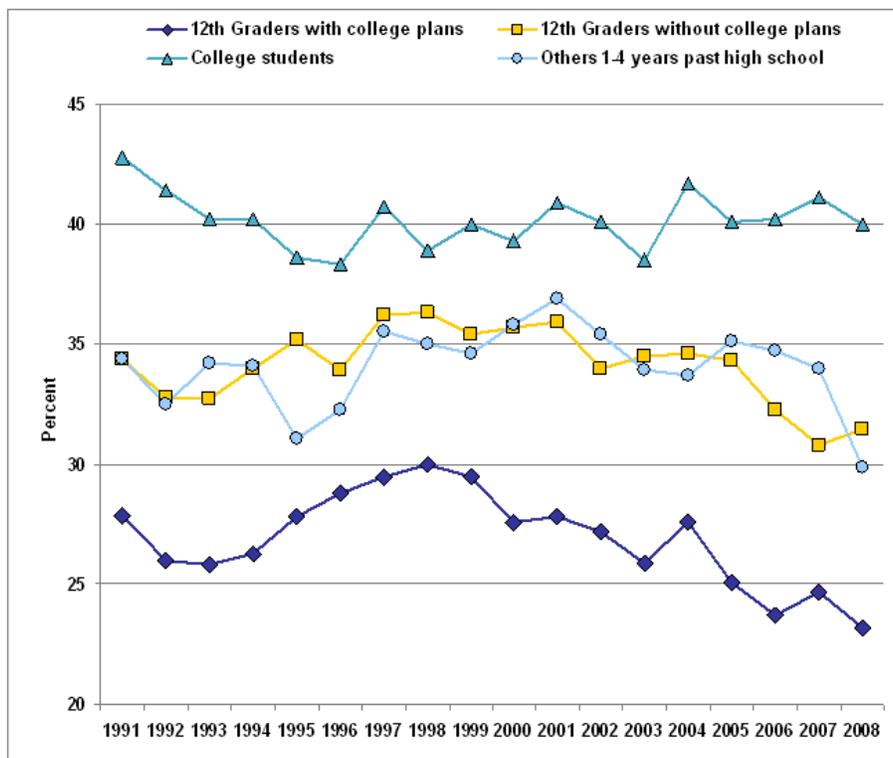
Although colleges and universities vary widely in their student binge drinking rates, overall rates of college student drinking and binge drinking exceed those of their age peers who do not attend college (Johnston et al., 2009b). Of college students, 83 percent drink and 41 percent report drinking five 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., 2009b). 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 (Figure 2.14) (Johnston et al., 2009b). This finding suggests that college environments influence drinking practices (Hingson et al., 2002; Kuo et al., 2003).

Figure 2.13 – Trends in the Percentage of Male and Female 12th Graders’ Using Alcoholic Beverages by Beverage Type, 1988-2009 (Johnston et al., 2009a; Johnston, personal communication, 2010)



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 4 in 5 college students drink alcohol, about 2 in 5 engage in binge drinking (5 or more drinks in a row for men and 4 or more in a row for women within the past 2 weeks or 30 days, depending upon the survey), and about 1 in 5 engages in frequent bingeing (3 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 5 drinks per occasion (Wechsler et al. 1999).

Figure 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 (Johnston et al., 2009a, 2009b; Johnston, personal communication, 2010)



Alcohol Is Perceived as Readily Available by the Underage Population

Most teens see alcohol as readily available. In 2009, 61.8 percent of 8th, 80.9 percent of 10th, and 92.1 percent of 12th graders said alcohol would be “fairly easy” or “very easy” to get (Johnston et al., 2009c). Perceived availability, however, has declined in some groups. In 1992, 76.2 percent of 8th graders perceived alcohol as easily available versus 61.8 percent in 2009. For 10th graders, perception of availability peaked in 1996 at 90.4 percent; by 2009, only 80.9 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 et al., 2005).

A few small studies show the most frequent means of obtaining alcohol to be parties, friends, adult purchasers (Harrison et al., 2000; Preusser et al., 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

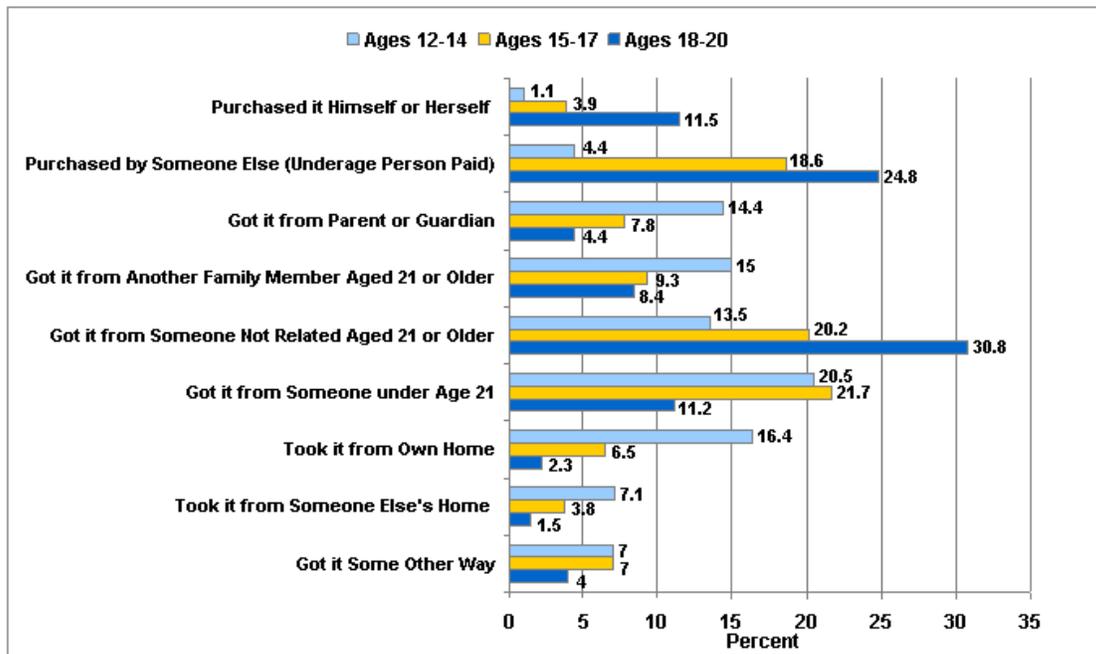
sources appears to be much higher among college students, in urban settings, and where possession and purchase laws are relatively weak or unenforced.”

Prior to 2006, NSDUH only collected data on the *perception* of alcohol availability by those under 21. New items were added in 2006 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 2008 and 2009 show that among all underage current drinkers, 30.5 percent paid for alcohol the last time they drank (8.7 percent purchased the alcohol themselves; 21.8 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 4.0 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, 69.5 percent did not pay for the alcohol the last time they drank; 26.8 percent were given alcohol for free by an unrelated individual age 21 or older. One in seventeen (5.9 percent) got the alcohol from a parent or guardian, 9.0 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 (20.5 percent), taking it from their own home (16.4 percent) or receiving it from a parent or guardian (15.0 percent). For youths ages 15 to 17, the most common sources were receiving it free from someone under the age of 21 (21.7 percent), receiving it from an unrelated person ages 21 or older (20.2 percent), and giving somebody else money to purchase the alcohol (18.6 percent). As shown in Figure 2.15, among 18- to 20-year-olds, most current drinkers either received alcohol for free from an unrelated person ages 21 or older (30.8 percent) or gave somebody else money to purchase the alcohol (24.8 percent; SAMHSA, CBHSQ, NSDUH, special data analysis, 2010).

Figure 2.15 – Source of Last Alcohol Used Among Past-Month Alcohol Users Ages 12 to 20, by Age Group: 2008-2009 (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010)



Older underage persons were more likely to have paid for alcohol themselves on their last drinking occasion: 36.4 percent of 18- to 20-year-olds did so compared with 22.6 percent of 15- to 17-year-olds and 5.5 percent of 12- to 14-year-olds. Male underage drinkers were more likely to have paid for alcohol themselves on their last drinking occasion (36.2 percent) than their female counterparts (24.1 percent) (SAMHSA, CBHSQ, NSDUH, special data analysis, 2010)¹⁷.

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

The STOP Act requires the Secretary of HHS 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).” FTC has not conducted any studies that measure alcohol depictions in entertainment media. To date, the FTC has conducted three formal studies of the exposure of those under 21 to alcohol advertising.

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

¹⁷ More detailed information can be found in the special report by Pemberton and colleagues titled *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>.

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.¹⁸

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 upon 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.¹⁹

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; further, because placements that missed the target were concentrated in smaller media, more than 97 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.²⁰

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 Some Progress, Underage Drinking Remains Unacceptably High

Available data from 1975 to 2009 document that the prevalence of drinking among 12th graders peaked in 1978 for lifetime use and past-year use (Johnston et al., 2009a,c). 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 et al., 2007). Levels of lifetime alcohol use remained steady in 2007, 2008, and 2009 (Johnston et al., 2009a,c). Past-month use among 12th graders increased between 1975 and 1978, decreased slightly between 1978 and 1988, decreased

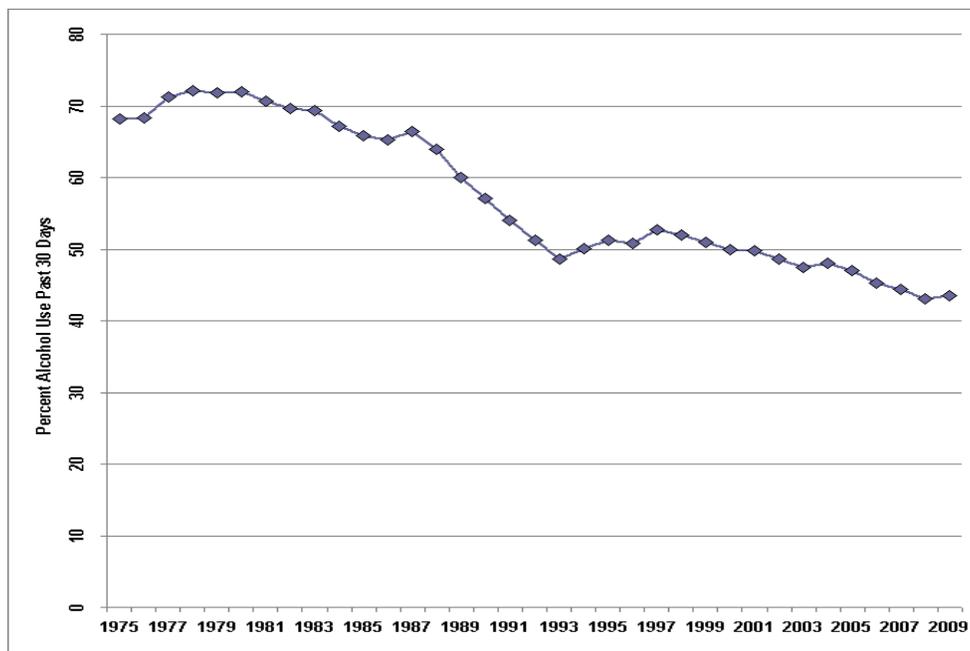
¹⁸ For more information, see *Self-Regulation in the Alcohol Industry* (FTC, 1999), available at <http://www.ftc.gov/reports/alcohol/alcoholreport.htm>.

¹⁹ For more information, see *Alcohol Marketing and Advertising* (FTC, 2003), available at <http://www.ftc.gov/os/2003/09/alcohol08report.pdf>.

²⁰ For more information, see *Self-Regulation in the Alcohol Industry* (FTC, 2008), available at <http://www.ftc.gov/os/2008/06/080626alcoholreport.pdf>.

between 1988 and 1993, increased between 1993 and 1997, and decreased between 1997 and 2002 (Figure 2.16; Johnston et al., 2009a,c).

Figure 2.16 – Trend in Thirty Day Prevalence of Alcohol Use for Twelfth Graders, 1975-2009 (Johnston et al., 2009a, 2009c)



The percentage of high school seniors who reported drinking within the past 30 days was the same in 1993 and 2002 (48.6 percent). Although a modest reduction has occurred in 30-day and annual usage rates over the past several years, current rates are not markedly different from 1993, and they remain high (Johnston et al., 2009c).

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., 2009a).

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 10th graders in MTF and drinking five or more drinks in a row by 10th graders in YRBS” (Faden and Fay, 2004). They write, “These results considered together offer stronger support for the finding of stability or decrease in youth drinking prevalence in the past 10 years or so than results from any one survey do by themselves.”

These results are encouraging. 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 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

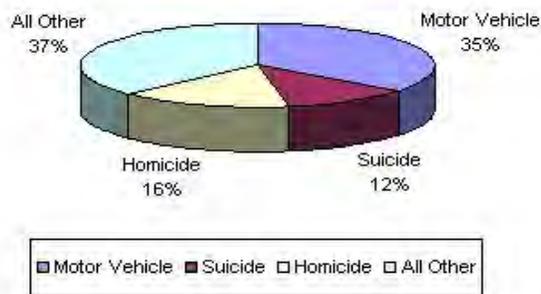
According to the *Call to Action*, about 5,000 people under age 21 die annually from alcohol-related injuries involving underage drinking. The greatest mortality risk for underage drinkers is motor vehicle crashes. In 2008, of the 2,739 drivers ages 15 to 20 who were killed in motor vehicle traffic crashes, 838 (31 percent) had a BAC of .01 or higher; 144 (5 percent of all fatally injured drivers this age) had a BAC of .01 to .07 g/dL, and 694 (25 percent of fatally injured drivers this age) had a BAC of .08 g/dL or higher (NCSA, 2009). In 2008, of the 411 nonoccupants (pedestrians and pedal cyclists) in the 15 to 20 year age group killed in motor vehicle traffic crashes, 115 (28 percent) had a BAC of .01 g/dL or higher—16 (4 percent of all nonoccupant fatalities this age) had a BAC of .01-.07 g/dL, and 99 (24 percent of nonoccupant fatalities this age) had a BAC of .08 g/dL or higher (NCSA, 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 at 0.08 BAC, adult drivers in all age and gender groups compared to sober drivers were 11 times more likely to die in a single vehicle crash. Among those ages 16-20 at 0.08 percent BAC, male drivers were 52 times more likely than sober male drivers the same age to die in a single vehicle fatal crash (Zador, 1991). According to 2009 survey data, about 3.8 percent of 16-year-olds, 8.7 percent of 17-year-olds, 14.1 percent of 18-year-olds, 17.5 percent of 19-year-olds, and 18.7 percent of 20-year-olds reported driving under the influence of alcohol at least once in the past year (SAMHSA, 2010). In general, the reported prevalence of driving under the influence of alcohol increases with age until about 25, although there is some variation among survey years. For example, in the 2008 NSDUH, prevalence peaked at age 22, then declined for older persons. Overall, 29.1 percent of high school students in the 2007 YRBS had, in the past 30 days, ridden with a driver who had been drinking; 31.5 percent of seniors had done so (Eaton et al., 2008).

Other Unintentional Injuries Such as Burns, Falls, and Drowning

In addition to motor vehicle crashes, underage drinking contributes to all major causes of fatal and nonfatal trauma experienced by young people (Figure 2.17). In 2006, 2,332 individuals ages 16 to 20 died from unintentional injuries other than motor vehicle crashes, such as poisoning, drowning, falls, burns, and so forth (CDC, 2009a). Research suggests that approximately 40 percent of these deaths were alcohol attributable (Smith et al., 1999).

Figure 2.17 – Leading Causes of Death for Teens²¹



Suicide, Homicide, and Violence

In 2006, 3,147 people ages 12 to 20 died from homicide and 2,220 from suicide (CDC, 2009a). 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 et al., 1999). Individuals under the age of 21 commit 45 percent of rapes, 44 percent of robberies, and 37 percent of other assaults (Levy et al., 1999). The degree to which violent crimes committed by those under 21 are alcohol related remains to be determined.

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, 2009a).

Risky Sexual Activity

According to the *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 and 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 and Bast, 1988, Stratton, et al., 1996, Jones et al., 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 discussed earlier.

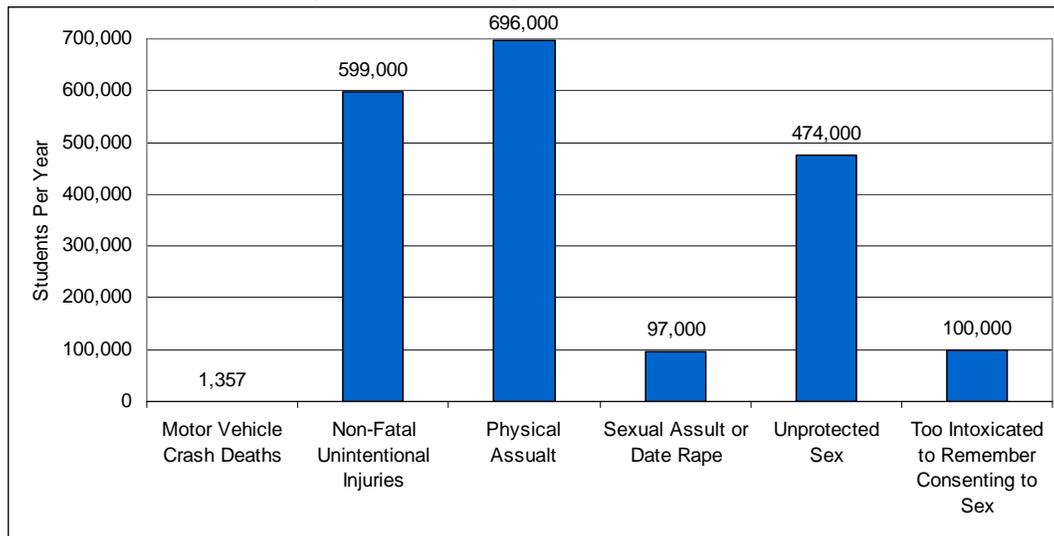
²¹http://www.nhtsa.dot.gov/portal/site/nhtsa/template.MAXIMIZE/menuitem.cd18639c9dadabbbbf30811060008a0c/?java_x_portlet.tpst=4427b997caacf504a8bdba101891ef9a_ws_MX&javax.portlet.prp_4427b997caacf504a8bdba101891ef9a_viewid=detail_view&itemID=59e8492389274210VgnVCM1000002fd17898RCRD&viewType=standard

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 associated 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 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 each year (Figure 2.18). Approximately 25 percent of college students report academic

Figure 2.18 – Prevalence of Alcohol-Related Morbidity and Mortality Among College Students Ages 18-24 (Hingson et. al., 2002, 2005, 2009)



consequences 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

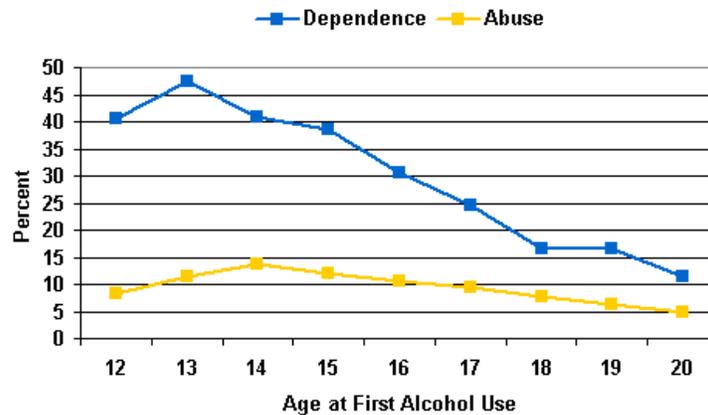
Adverse effects on normal brain development are a potential long-term risk of underage alcohol consumption. Neurobiological research suggests that adolescence may be a period of unique vulnerability to the effects of alcohol. For example, early heavy alcohol use may have negative effects on the actual physical development of the brain structure of adolescents (Brown and Tapert, 2004), as well as on brain functioning. Negative effects indicated by neuropsychological studies include decreased ability in planning, executive functioning, memory, spatial operations, and attention, all of which play important roles in academic performance and future levels of functioning (Giancola & Mezzich, 2000; Brown et al., 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 et al. 2009).

Increased Risk of Developing an Alcohol Use Disorder Later in Life

Early onset of alcohol use (14 or younger), alone and in combination with escalated drinking in adolescence, has been documented in a number of studies as a risk factor for the development of alcohol-related problems in adulthood (Agrawal et al., 2009; Grant and Dawson, 1997; Gruber et al., 1996; Hawkins et al., 1997; Schulenburg et al., 1996; York et al., 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, rates of alcohol dependence among those who started drinking at ages 17 and 18 were 24.5 percent and 16.6 percent, respectively (Figure 2.19). Only 10-11 percent who started at age 21 or older met the criteria.

Figure 2.19 – 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 and Przybeck, 1985; Hawkins, et al., 1997) and involvement in alcohol-related traffic crashes (National Center for Statistics and Analysis, [NCSA], 2005b). Adults who started drinking at age 14 were three times more likely to report driving after drinking too much ever in their lives than 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 et al, 2001). Children of parents who binge are twice as likely to binge themselves and to meet alcohol dependence criteria.

Underage Drinking Affects Academic Performance

It has been known for decades that underage drinking affects academic performance. In 2009, of the 1 million high school students who binge drank at least five times per month, one-third drank on school property. These students were three times more likely to report earning mostly Ds and Fs on their report cards (YRBS, 2009).

Other Risky Behaviors and Negative Consequences

A variety of other risky behaviors are associated with underage alcohol use. Some of these behaviors include riding with a driver who has been drinking, tobacco use, illicit drug use, attempting suicide, and carrying a weapon to school (NIAAA, 2002b; Eaton et al., 2008; Miller et al., 2007). Although data indicate that alcohol use is correlated with these risky behaviors, the question of causation remains open. Nevertheless, alcohol can impair an individual's decision-making capacity and reduce inhibitions. Therefore, drinking may be related to the decision to engage in risky behavior, particularly in adolescents—whose judgment, self-regulation, and decision-making capabilities are still developing. Other consequences of underage drinking include death from alcohol poisoning, academic problems, various social problems, and physical problems such as medical illnesses.

Underage drinking may also result in FASDs, which can cause serious disabilities that last a lifetime. FASDs are preventable if a woman does not drink during pregnancy. The social costs of underage drinking are conservatively estimated at \$53 billion, including \$19 billion from traffic crashes and \$29 billion from violent crime (PIRE, 1999).

UNDERAGE DRINKING: A DEVELOPMENTAL PHENOMENON

As the Acting Surgeon General wrote in the introduction to the *Call to Action*:

...the latest research also offers hopeful new possibilities for prevention and intervention by furthering our understanding of underage alcohol use as a developmental phenomenon—as a behavior directly related to maturational processes in adolescence. New research explains why adolescents use alcohol differently from adults, why they react uniquely to it, and why alcohol can pose such a powerful attraction to adolescents, with unpredictable and potentially devastating outcomes.

This understanding of underage alcohol use as a developmental phenomenon is one of the major themes of the *Call to Action* and is an important new concept in this report.

Adolescence is the period between the onset of puberty²² and the assumption of adult roles. It is a time of particular vulnerability to alcohol use and its consequences for a variety of developmental reasons, some specific to the individual and others related to the biological and behavioral changes produced by adolescence itself. In addition, alcohol can present a special allure to some adolescents for social, genetic, psychological, and cultural reasons. Recent advances in the fields of epidemiology, developmental psychopathology, human brain development, and behavioral genetics have provided new insights into adolescent development and its relationship to underage alcohol use.

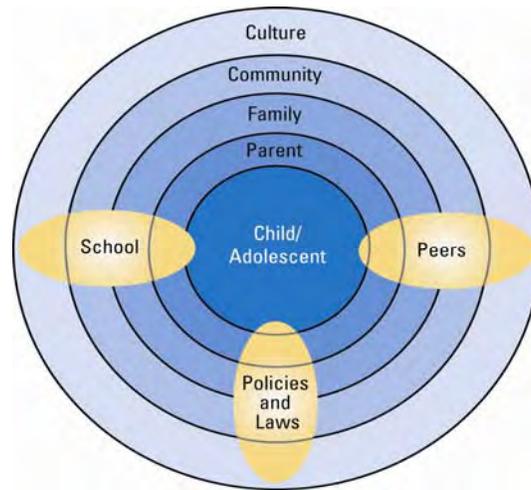
²² For the purpose of this Report, puberty is defined as a sequence of events by which a child becomes a young adult characterized by secretions of hormones, development of secondary sexual characteristics, reproductive functions, and growth spurts.

Adolescent alcohol consumption is a complex behavior influenced by multiple factors, including the normal maturational changes that all adolescents experience; the various social and cultural contexts in which adolescents live (e.g., family, peers, and school); genetic, psychological, and social factors specific to each adolescent; and environmental factors that influence the availability and appeal of alcohol (e.g., enforcement of underage alcohol policies, marketing practices, media exposure, etc.). Biological factors internal to the adolescent, such as genes and hormones, interact with factors external to the adolescent, such as peers, school, and the overall culture in determining whether an adolescent will use alcohol. Internal and external factors influence each other in reciprocal ways as the adolescent's development unfolds over time. Youth are not at uniform risk for alcohol consumption nor are they uniformly at risk over the span of their own adolescence.

An important aspect of understanding the adolescent attraction to alcohol, as well as the means by which its use can be prevented or reduced, is appreciating the significant influence of the social systems in which adolescents operate. These many different social systems both influence adolescents and are, in turn, influenced by them (Bronfenbrenner, 1979). As shown in Figure 2.20, these systems include the adolescent's family, peers, school, extracurricular and community activities, sports teams and clubs, religious institutions, other diverse organizations with which the adolescent interacts, part-time work, the community itself, the culture, and even influences from around the world accessed through the Internet and other electronic resources. Each social system exposes the adolescent to both positive and negative influences, potentially increasing or decreasing the adolescent's risk of alcohol use. These multiple systems interact and may reinforce or contradict each other.

Each system may affect an adolescent's decision to use alcohol. To protect adolescents properly from alcohol use, parents and other adults must be involved in multiple social systems as individuals, citizens, and voters. By understanding the role these systems play in the teen's life and by acting strategically on the basis of established and emerging research, parents, other adults, and the Nation can reduce the risk and consequences of underage alcohol use.

Figure 2.20 – Systems That Influence Adolescent Behavior (HHS, 2007)



This schematic represents the multiple systems in which adolescents are embedded. Their relative influences vary across development.

An understanding of underage alcohol use as a developmental phenomenon sheds significant light on the particular vulnerabilities of adolescents to alcohol use, as well as protective measures likely to prevent and reduce underage drinking. Among the most important developmental findings included in the *Call to Action* are the following:

- **The Developing Adolescent Brain:** During adolescence, dramatic changes to the brain’s structure, neuron connectivity (i.e., “wiring”), and physiology occur (Restak, 2001). These changes affect everything from emerging sexuality to emotionality and judgment. However, not all parts of the brain mature at the same time. Differences in maturational timing across the brain can result in impulsive decisions or actions, disregard for consequences, and emotional reactions that can lead to alcohol use or otherwise put teenagers at serious risk.
- **Stress and Adolescent Transitions:** The physical effects of puberty create dramatic changes in the sexual and social experiences of maturing adolescents that require significant psychological and social adaptation, creating stress that may contribute to increased consumption of alcohol during the adolescent period (Tschann et al., 1994). In graduating from elementary to middle school, from middle to high school, and from high school to college or the workplace, adolescents face new stressors. Research shows a link between stress and alcohol consumption. For example, research on nonhuman primates shows that adolescent monkeys double their alcohol intake under stress and that excessive alcohol consumption is related to changes in stress hormones and serotonin (Barr et al., 2004).
- **Personality Traits:** Studies of adolescent drinking have repeatedly failed to find specific sets of personality traits that uniquely predict alcohol use in adolescents. Nonetheless, research does show that adolescents who use alcohol heavily or have alcohol use disorders (AUDs) do exhibit certain shared personality traits (also shared by some adolescents who do not abuse alcohol). High levels of impulsiveness, aggression, conduct problems, novelty seeking (Gabel et al., 1999), low harm avoidance (Jones and Heaven, 1998), and other risky

- **Mental Disorders:** Depression and anxiety are risk factors for alcohol problems because some people drink to cope with internal distress. Adolescents with defined mental disorders have significantly elevated rates of alcohol and other drug use problems. Because many young people are involved not only with alcohol but with other substances and may also have a co-occurring mental disorder, interventions should be designed to address this complexity.
- **Adolescents from Families With a Family History of Alcohol Dependence:** Children whose families include individuals who abuse alcohol are at increased risk for alcohol dependence throughout their lives. Genes account for over half of the risk for alcohol dependence; environmental factors account for the rest. However, no single gene accounts for the majority of risk. The development of a complex behavioral disorder such as alcohol dependence likely depends on specific genetic factors interacting with one another, multiple environmental factors, and the interaction between genetic and environmental factors. Research suggests that genes have a stronger influence on the development of problematic use, whereas environment seems to play a greater role in initiation of use (Rhee et al., 2003). The current college environment may increase the likelihood that persons with genetic predispositions to alcohol use disorders will have those predispositions expressed (Timberlake, et al., 2007).
- **Sensitivity to the Effects of Alcohol Use:** Animal research indicates that adolescents in general are more sensitive than adults to the stimulating effects of alcohol and less sensitive to some of the aversive effects of acute alcohol intoxication, such as sedation, hangover, and ataxia (loss of muscular coordination) (Doremus et al., 2003; Little et al., 1996; Silveri and Spear, 1998; Varlinskaya and Spear, 2004; White, et al., 2002; for review, see Spear, 2000 and Spear and Varlinskaya, 2005). This differing sensitivity may make adolescents more vulnerable to certain harmful effects of alcohol use. For example, adolescents are able to drink more than adults (who might pass out or be inclined to go to sleep) and therefore are more likely than adults to initiate activities when they are too impaired to perform them competently, such as driving. They are also more likely to drink to the point of coma. Furthermore, in the case of driving, each drink increases impairment more for adolescents than adults (Hingson and Winter, 2003). Children whose parents abuse alcohol may be at even greater risk for excessive drinking resulting from a combination of genetic and developmental factors that lower their sensitivity to alcohol.

These issues are reviewed in detail in *Underage Drinking: Understanding and Reducing Risk in the Context of Human Development*, a special supplement of the journal *Pediatrics* (2008).

INTERVENING AMIDST COMPLEXITY

Underage alcohol use is a highly complex phenomenon driven by a variety of interacting factors. A developmental approach to preventing and reducing underage alcohol use takes into account these complex forces and factors that determine an adolescent's decision to use or not use alcohol. Complex interactions among biological, social, cultural, and environmental factors evolve as maturation proceeds; thus, the same adolescent at age 13 and later at age 17 will have different developmental needs and require different protective structures and skills to avoid the use of alcohol. To further complicate matters, periods of rapid transition, reorganization, and growth spurts alternate with periods of quiet and consolidation—all within a changing social context. A developmental approach to the prevention and reduction of underage drinking recognizes the importance of all environmental and social systems that affect adolescents, as well as adolescents' maturational processes and individual characteristics.

One of the advantages of understanding underage alcohol use as a developmental phenomenon is the unique insight it provides into risk and protective factors. Although the problem of underage drinking is complex, it is not insurmountable. A developmental approach makes clear the need for a coordinated national effort to prevent and reduce underage drinking and for the active involvement of both the public and private sectors as well as parents, other caregivers, and other adults. Success in solving a public health and safety problem as complex as underage drinking will require the engagement of every American, as the *Call to Action* puts it, “in a national effort to address underage drinking early, continuously, and in the context of human development. Underage alcohol use is everybody's problem—and its solution is everybody's responsibility.”

CONCLUSION

The social, individual, and economic consequences of underage drinking make it a leading health problem in the United States—one that has remained stubbornly resistant to a variety of measures initiated to prevent and reduce it over the past three decades. The primary preventive issue in underage drinking is to delay onset of alcohol use for as long as possible, and preferably until the age of 21. Yet that delay must be achieved within an environment in which adult alcohol use is an accepted part of American life and alcohol is attractive to most underage youth and readily available to them. The goals and strategies proposed by the *Call to Action* and incorporated into this Report recognize that the involvement of Federal, State, and local governments; private-sector organizations and institutions; concerned individuals; and parents of underage youth, as well as youth themselves, is critical in making progress against this challenging health problem.