

CHAPTER 2

The Nature and Extent of Underage

Drinking in America

This document is excerpted from:

The June 2015 Report to Congress on the Prevention and Reduction of Underage Drinking

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 4,300 deaths among underage youths in the United States every year, shortening their lives by an average of 60 years (<http://www.cdc.gov/alcohol/fact-sheets/underage-drinking.htm>).

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 old, 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 health care 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;¹⁴ 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.

¹⁴ Please note for comparability with the 2012 NSDUH and 2011 YRBS data (the most recent data available), the latest MTF data included in the report are also from 2012. The 2013 MTF data, which became available in December 2013, will be included in the next report.

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 2012 NSDUH reported that approximately 24.3 percent of Americans ages 12 through 20 (about 9.3 million people) reported having at least one drink in the 30 days prior to the survey interview. Of this age group, 15.3 percent (5.9 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 4.3 percent of this age group (1.7 million) were heavy drinkers (five or more drinks on the same occasion on each of 5 or more days in the past 30 days). Thus (by definition), all heavy alcohol users are also binge alcohol users (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013a).
- **Lifetime Use:** MTF 2012 showed that 69.4 percent of 12th, 54.0 percent of 10th, and 29.5 percent of 8th graders have had alcohol at some point in their lives¹⁵ (Johnston, O'Malley, Bachman, & Schulenberg, 2013a). See Exhibit 2.1.
- **Binge Use:** The 2012 NSDUH showed that 4.0 percent of 14-year-olds, 11.8 percent of 16-year-olds, 26.0 percent of 18-year-olds, and 35.3 percent of 20-year-olds engaged in binge drinking within the past 30 days (SAMHSA, 2013b).
- **Heavy Use:** The 2012 NSDUH data showed that 2.4 percent of 16-year-olds, 6.6 percent of 18-year-olds, and 12.6 percent of 20-year-olds consumed alcohol heavily in the past 30 days (SAMHSA, 2013b).
- **Use to Intoxication:** In MTF 2012, 54.2 percent of 12th, 34.6 percent of 10th, and 12.8 percent of 8th graders reported having been drunk¹⁶ at least once (Johnston et al., 2013a).
- **Past-Month Intoxication:** In MTF 2012, 28.1 percent of 12th, 14.5 percent of 10th, and 3.6 percent of 8th graders reported being drunk in the past month (Johnston et al., 2013a).

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 marijuana (the illicit drug most commonly used by adolescents) or tobacco (Johnston et al., 2013a).

¹⁵ Lifetime alcohol use in this survey is defined as “having more than a few sips.”

¹⁶ MTF asks “On how many occasions (if any) have you been drunk or very high during the past 30 days?”

Exhibit 2.1: Lifetime Alcohol Use, Use to Intoxication, and Use to Intoxication within the Past Month among 8th, 10th, and 12th Graders: 2012 (Johnston et al., 2013a)

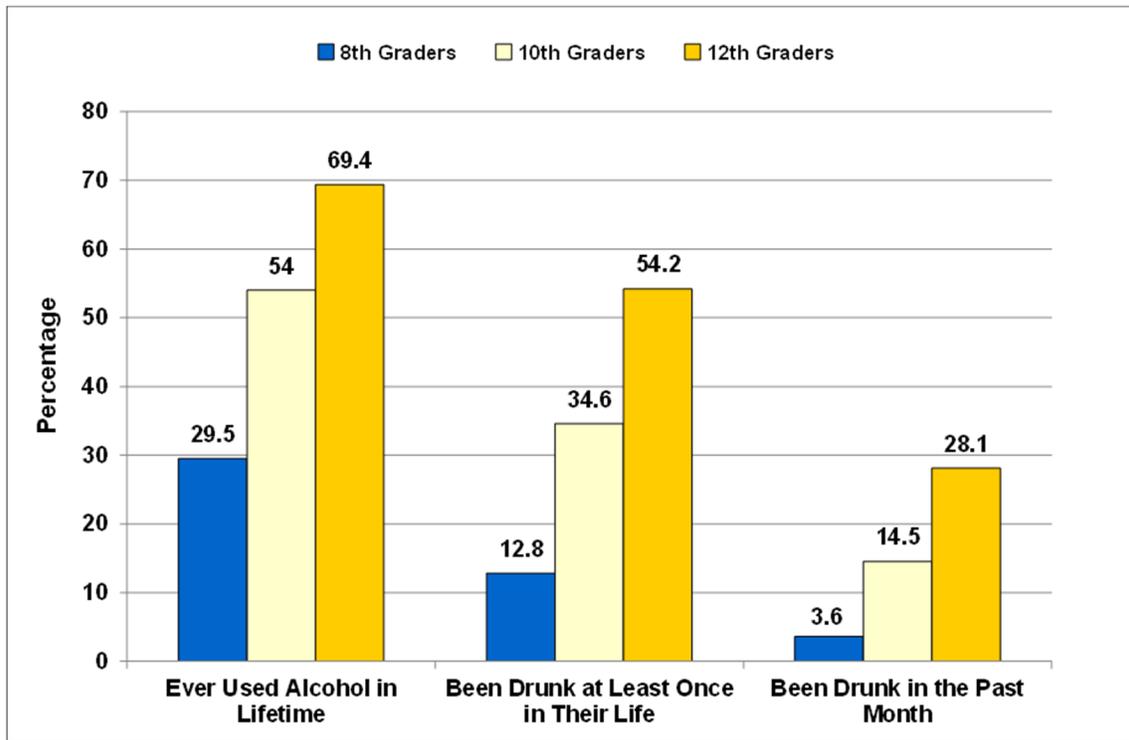
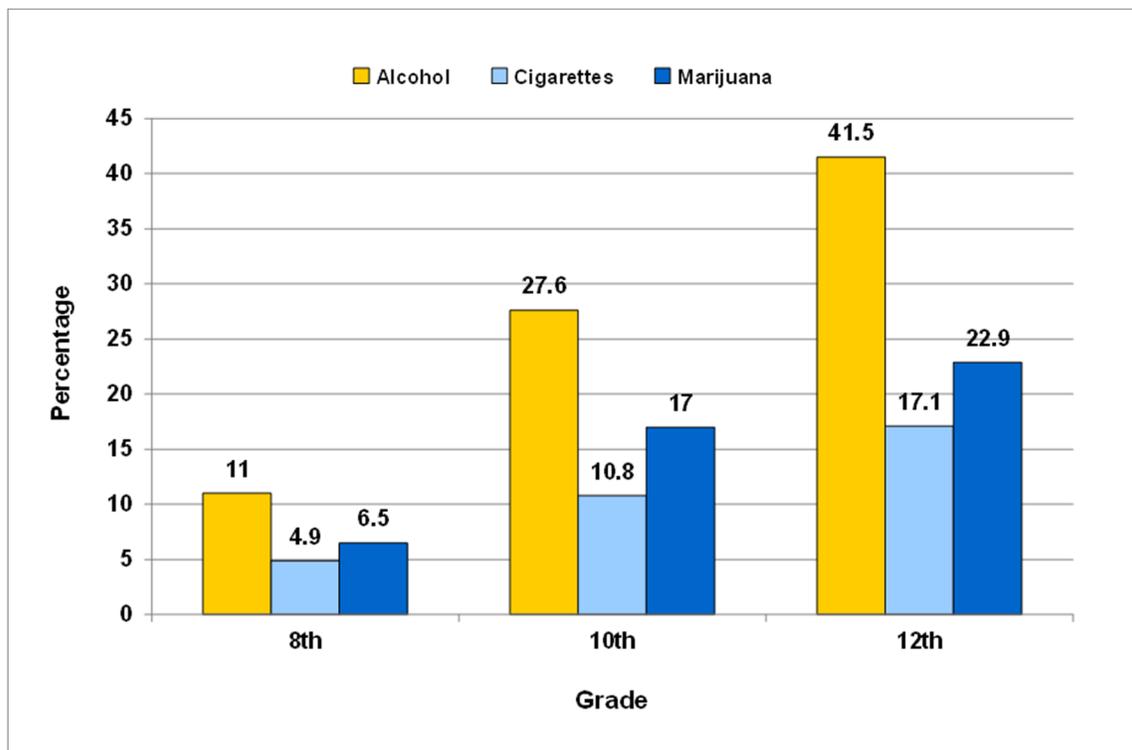


Exhibit 2.2: Past-Month Adolescent Alcohol, Cigarette, and Marijuana Use by Grade: 2012 (Johnston et al., 2013a)



Youths Start Drinking at an Early Age

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

- Ten percent of 9- to 10-year-olds have already started drinking (Donovan et al., 2004).¹⁷
- More than one fifth of underage drinkers begin drinking before age 13 (CDC, 2012b).
- Peak years of initiation are 7th through 11th grades based on data from high school seniors (Johnston, O'Malley, Bachman, & Schulenberg, 2009a).

Slightly fewer than 1 million (944,000) persons who initiated alcohol use in the past year reported being ages 12 to 14 when they initiated. This translates to approximately 2,579 youths ages 12 to 14 who initiated alcohol use per day in 2012 (SAMHSA, 2013c). 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 dating violence (Blitstein, Murray, Lytle, Birnbaum, & Perry, 2005; Ellickson, Tucker, & Klein, 2003; Ramisetty-Mikler, Goebert, Nishimura, & Caetano, 2006); criminal behavior (Eaton, Davis, Barrios, Brener, & Noonan, 2007); prescription drug misuse (Hermos, Winter, Heeren, & Hingson, 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, which means that 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 of those who started using alcohol before 7th grade generally declined from 1998 to 2012, suggesting a possible delay in the age at first use (Johnston et al., 2013a).

SAMHSA revised its methodology to provide more timely estimates that 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. By this new method, NSDUH data indicate no difference in the average age of first use (15.6 years) among those who initiated alcohol use before age 21 between 2004 and 2005, but a significant increase to 15.8 years in 2006. The average age of first use then remained nearly the same in 2007 (15.8 years), 2008 (15.8 years), and 2009 (15.9 years) before a statistically significant increase in 2010 (16.0 years, which was higher than all estimates from 2004 through 2009), then remained stable in 2011 and 2012 (15.9 years in 2011 and 16.0 years in 2012) (SAMHSA, 2013c). Average age of first use for all drinkers, including those who started drinking at age 21 or older, was 16.6 in 2006, 17.0 in 2007, 17.7 in 2008, 17.1 in 2009, 18.0 in 2010, 17.3 in 2011, and 17.6 in 2012 (SAMHSA, 2013c). Appendix A further discusses methodological issues in measuring age at first use and other indicators of alcohol initiation.

¹⁷ 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, Johnston, & Bachman, 1998). Frequent, heavy use by underage drinkers also increases each year from age 12 to age 20 (Flewelling, Paschall, & Ringwalt, 2004). The 2012 NSDUH reports that underage alcohol consumption in the past month increased with age in a steady progression from 1.2 percent for 12-year-olds to 53.3 percent for 20-year-olds and peaked at 69.7 percent for 21-year-olds (SAMHSA, 2013b). As shown in Exhibit 2.3, binge drinking also increased steadily between the ages of 12 and 20, peaking at age 21 (47.4 percent), and then decreased beyond young adulthood (data not shown) (SAMHSA, 2013b). Approximately 5.9 million (15.3 percent) 12- to 20-year-olds reported past-month binge alcohol use (SAMHSA, 2013b).

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 five times a month (SAMHSA, 2013c), whereas adult drinkers 26 and older average three drinks per occasion, eight times a month (SAMHSA, 2013c) (Exhibit 2.4). 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 (three to four drinks for persons ages 12 to 15) (Donovan, 2009).

Exhibit 2.3: Current and Binge Alcohol Use among Persons Ages 12–20 by Age: 2012 (SAMHSA, 2013b)

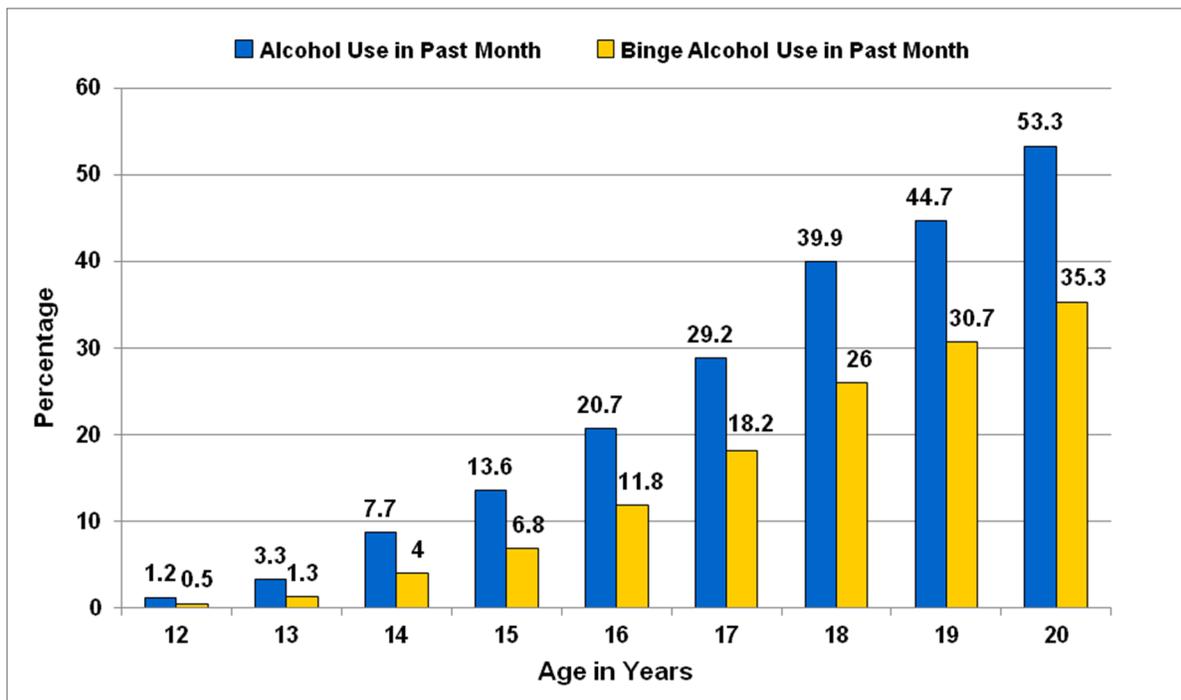
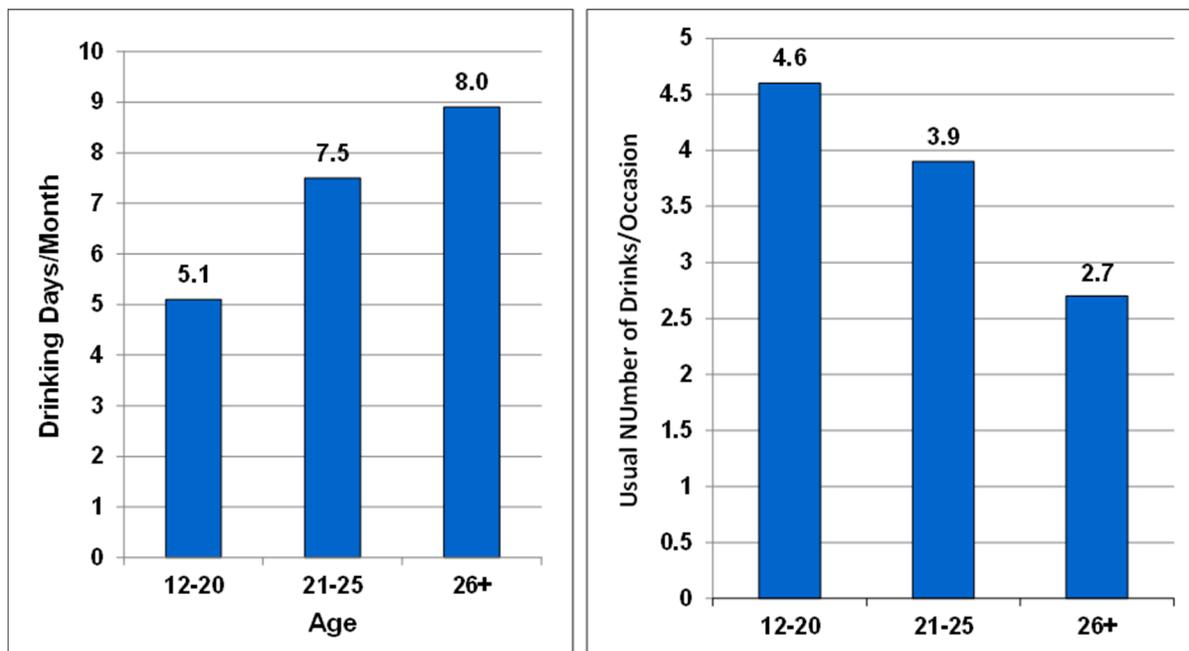


Exhibit 2.4: Number of Drinking Days per Month and Usual Number of Drinks per Occasion for Youth (12–20), Young Adults (21–25), and Adults (≥26): 2012 (SAMHSA, 2013c)



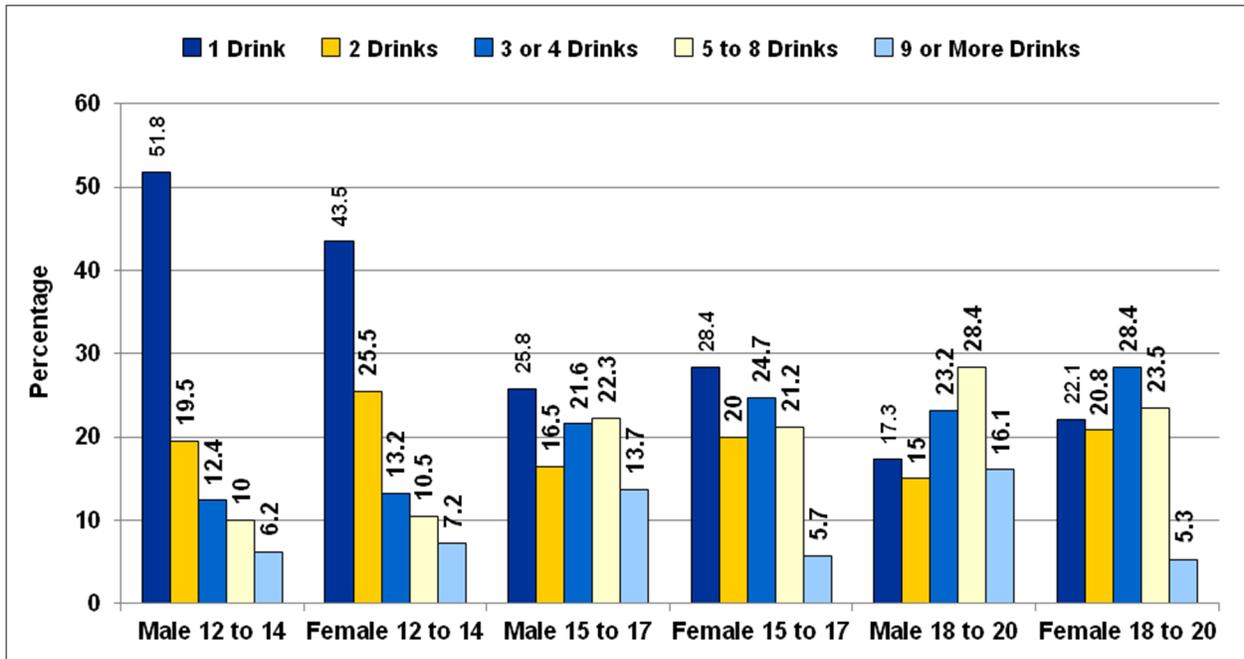
When asked about the number of drinks consumed on their last occasion of alcohol use in the past month, 23.1 percent of underage drinkers reported one drink; 18.1 percent, two drinks; 24.3 percent, three or four drinks; 24.0 percent, five to eight drinks; and 10.4 percent, nine or more drinks for 2011 and 2012 combined (SAMHSA, 2013c). The number of drinks consumed differs by gender (Exhibit 2.5): underage females are more likely to report consuming one to four drinks, and underage males, five to nine drinks or more. The number of drinks reported on the last occasion tends to increase with increasing age.

Particularly worrisome among underage drinkers is the high prevalence 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 2012, 5.1 percent of 8th, 15.6 percent of 10th, and 23.7 percent of 12th graders reported heavy episodic drinking (Johnston et al., 2013a). In 2012, about 1.7 million youth ages 12 through 20 (4.3 percent) drank five or more drinks on a single occasion¹⁸ 5 or more days a month (SAMHSA, 2013a).

Faden and Fay (2004) used 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 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,

¹⁸ If a typical 160-pound male drinks five standard drinks over a 2-hour period, he would reach a blood alcohol content of 0.08, making him legally intoxicated in all 50 states.

Exhibit 2.5: Number of Drinks Consumed on Last Occasion of Alcohol Use in the Past Month among Past-Month Alcohol Users Ages 12–20, by Gender and Age Group: 2011–2012 (SAMHSA, 2013c)



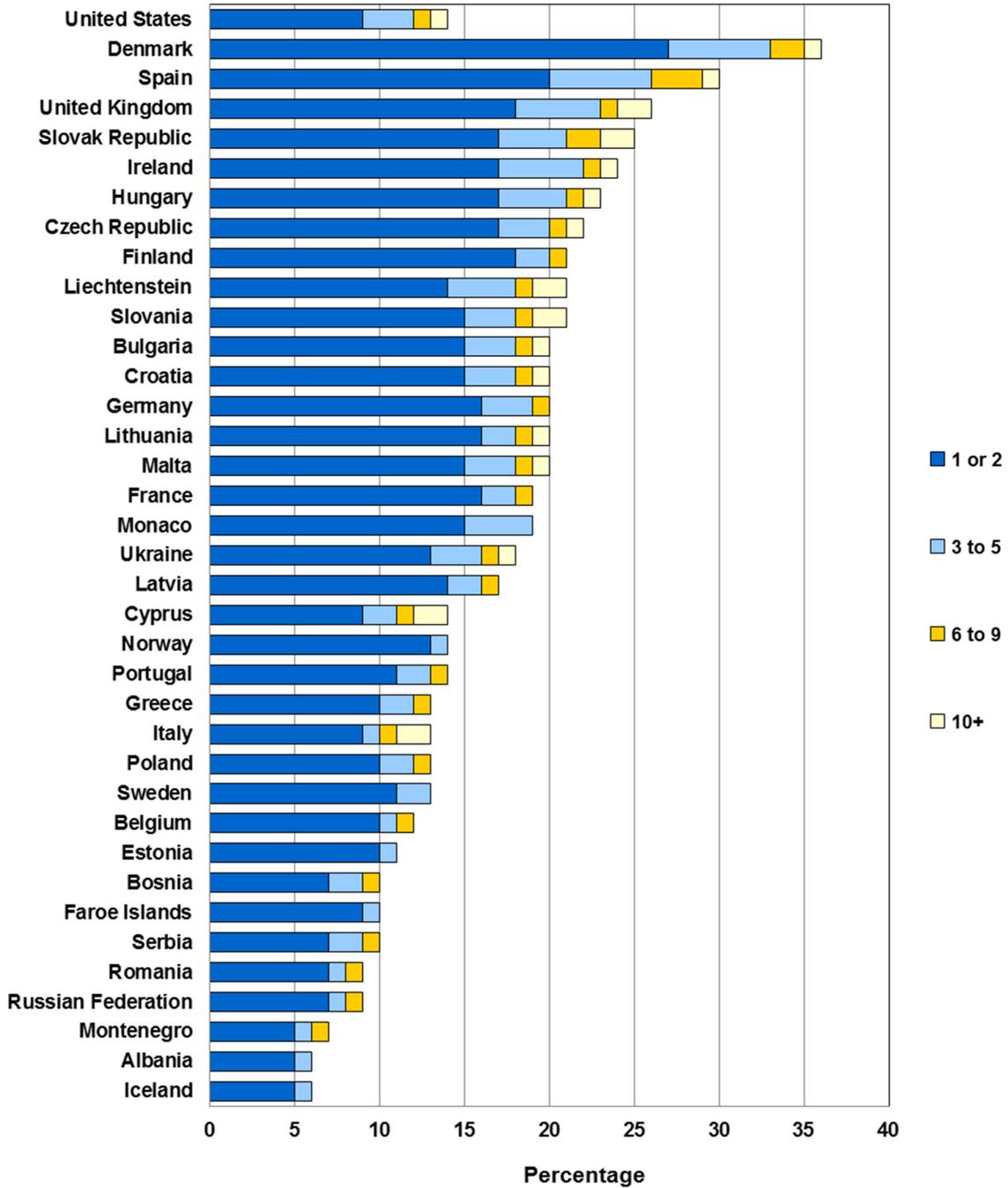
rose from 1993 to 1997, and declined from 1997 to 2002 (Faden & Fay, 2004). Subsequent statistical trend analyses showed that for 12th graders the prevalence of drinking five or more drinks in a row in the past 2 weeks continued to fall between 2002 and 2009 (Chen, Yi, & Faden, 2011).

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). Since 2002, there have been statistically significant declines in binge drinking for all three grades (Johnston, O’Malley, Bachman, & Schulenberg, 2012a).

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.

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., 2012; Data from the 2011 European School Survey Project on Alcohol and Drugs)



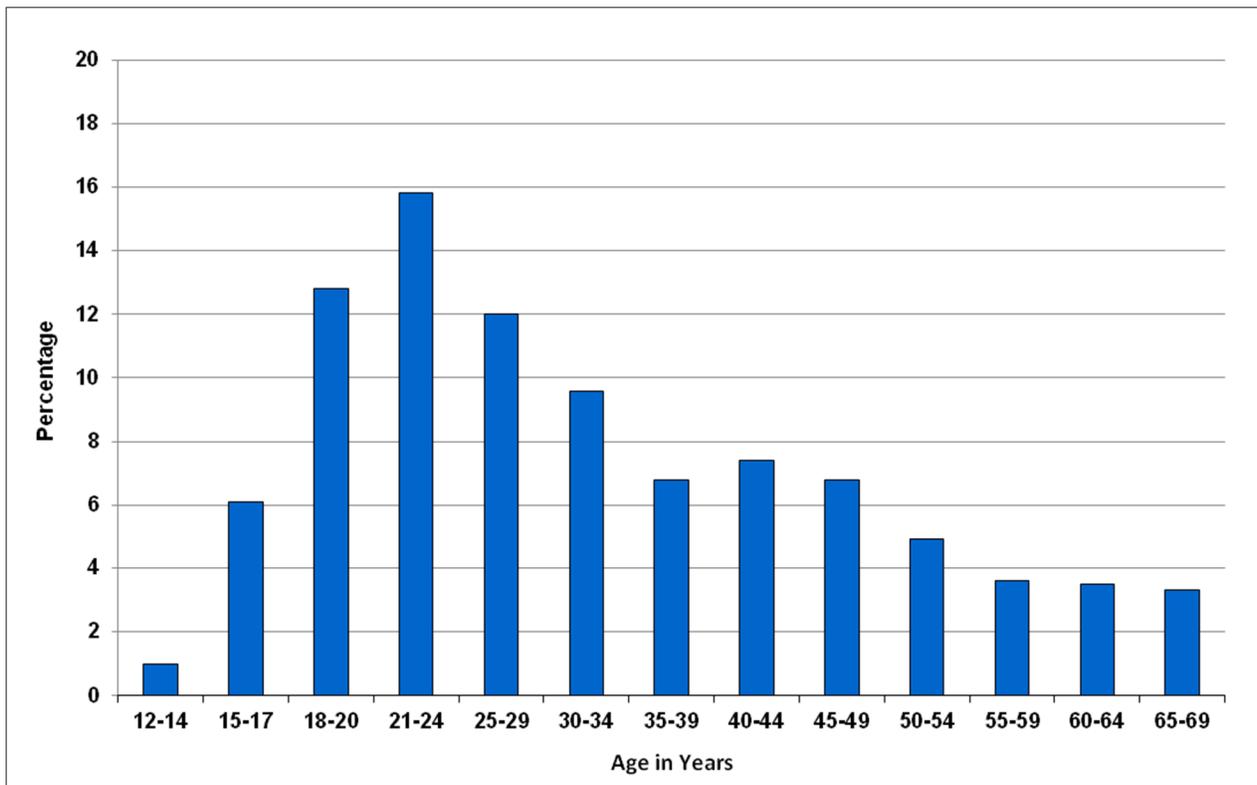
Note: The 2011 European School Survey Project on Alcohol and Drugs (ESPAD) question is: “On how many occasions (if any) have you been intoxicated from drinking alcoholic beverages (staggered when walking, not able to speak properly, throwing up or not remembering what happened)?” ESPAD data collection is performed every 4 years. The next survey will take place in spring 2015.

There Is a High Prevalence of Alcohol Use Disorders among Youth

The prevalence of alcohol abuse or dependence among underage drinkers is quite high. 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 lead to inconsistencies. As shown in Exhibit 2.7, according to the combined 2011–2012 NSDUH data, prevalence of alcohol dependence or abuse as defined by DSM-IV¹⁹ is highest among those ages 18 to 29.

About one in seven (13.6 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 (16.4 percent) and slightly higher than that for 25- to 29-year-olds (12.2 percent). In addition, 1.3 percent of 12- to 14-year-olds and 6.9 percent of 15- to 17-year-olds met criteria for alcohol dependence or abuse.

Exhibit 2.7: Prevalence of Past-Year DSM-IV Alcohol Dependence or Abuse by Age: 2011–2012 NSDUH (SAMHSA, 2013c)



¹⁹ The DSM-IV-TR (APA, 2000) criteria for abuse and dependence used in this study were originally developed for use with adults, and using them to assess abuse and dependence in adolescents may lead to inconsistencies. Several researchers are actively investigating this important issue (Harford, Yi, Faden, & Chen, 2009; Mewton, Teesson, Slade, & Grove, 2010). The newly released DSM-V (APA, 2013) provides new criteria for alcohol-related disorders, but does not specifically address adolescents.

Underage Drinking Differs by Gender

Any discussion of gender differences in underage drinking should include considerations of biological factors that may underlie or contribute to differences in drinking behavior and its consequences. A review by Schulte, Ramo, and Brown (2009) notes that differences in body composition (body fat versus muscle mass) lead to higher BAC in females from the same dose of alcohol proportionate to body weight and to lower alcohol reactivity (subjective effects as a function of dose) in males than in females. These two findings suggest that females will experience alcohol-related problems at lower doses of alcohol, a finding borne out by data on alcohol-related consequences cited later in this report.

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 2012 NSDUH data, 56.5 percent of males ages 12 and older were current drinkers compared with 47.9 percent of females in that age group. However, among underage drinkers, there were no significant gender differences in past-month alcohol use (Exhibit 2.8) (SAMHSA, 2013c). Among those ages 12 to 20 and those ages 18 to 20, binge-drinking rates were statistically significantly higher for males than females.

Binge-drinking prevalence is the most significant gender difference, at least among older adolescents. In 2012, 27.2 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 19.7 percent of female 12th graders did (Johnston et al., 2013a).

Since 1991, rates of binge drinking have been *decreasing* for college-age and 12th-, 10th-, and 8th-grade males and females, and the gap between male and female bingeing rates has been steadily declining since 1991 (Johnston et al., 2009c, 2012a) (Exhibit 2.9).

Exhibit 2.8: Past-Month Alcohol Use by Age and Gender, 2012 NSDUH Data (SAMHSA, 2013c)

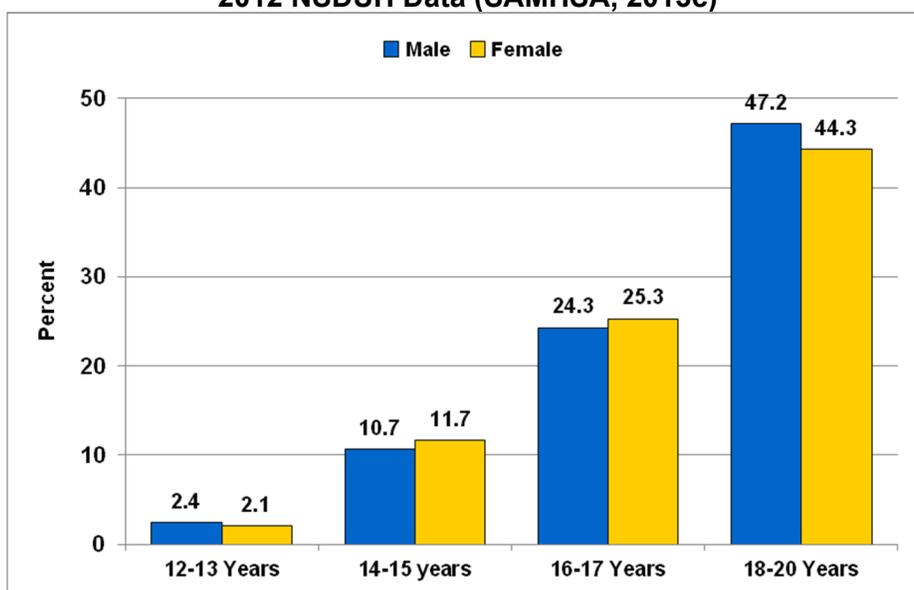
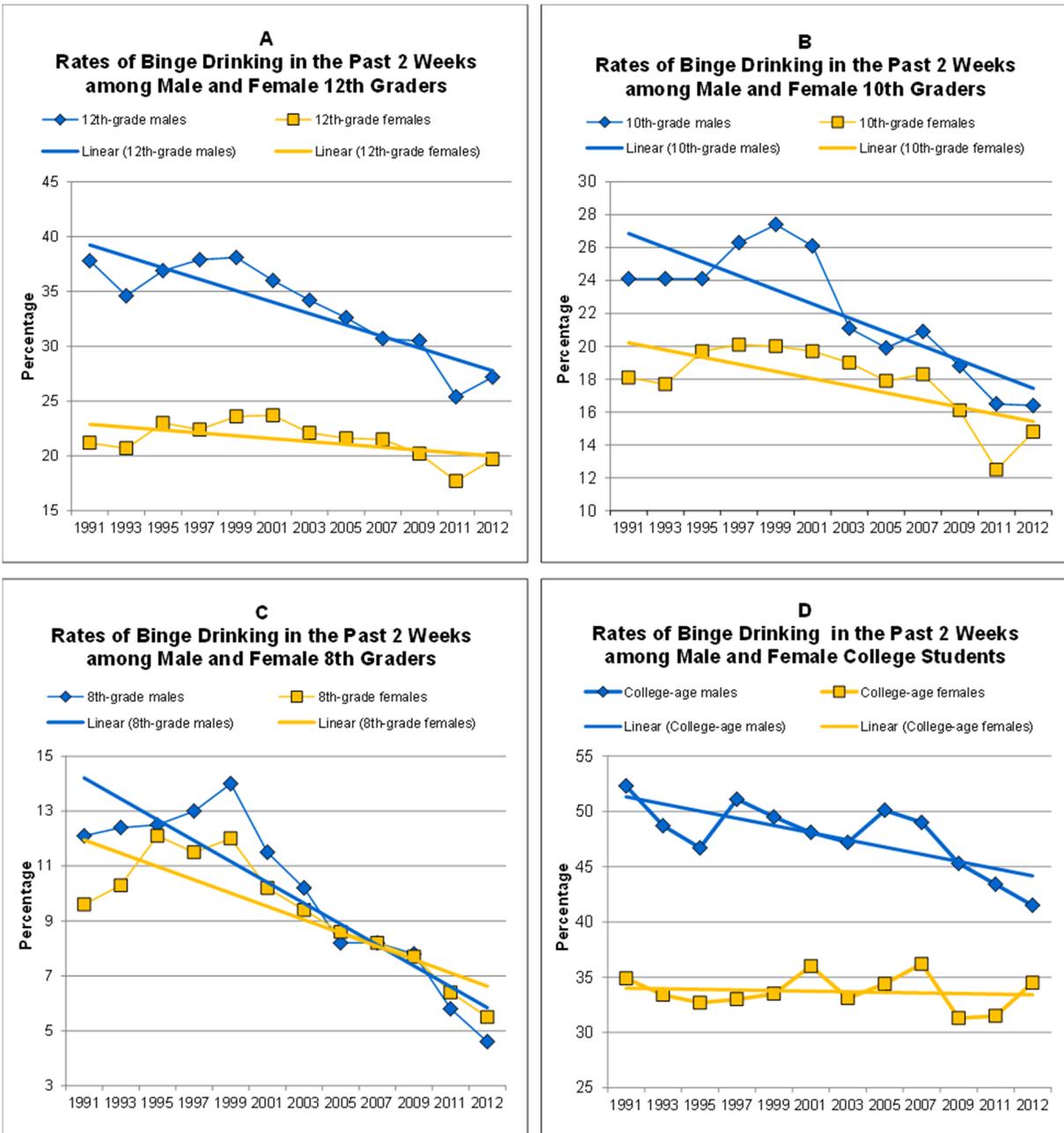


Exhibit 2.9: Rates of Binge Drinking in the Past 2 Weeks among Male and Female 8th, 10th, and 12th Graders and College Students, 1991–2012 (Johnston et al., 2013 a,b)²⁰



Across all grade groups, rates for males have been decreasing *faster* than for females. This is most easily seen in the slopes of the linear trend data (dotted lines) in Exhibit 2.9. In 1975, there was a 23 percentage point spread between the rates; in 2012, it was 7.5 points (Johnston et al., 2013a).

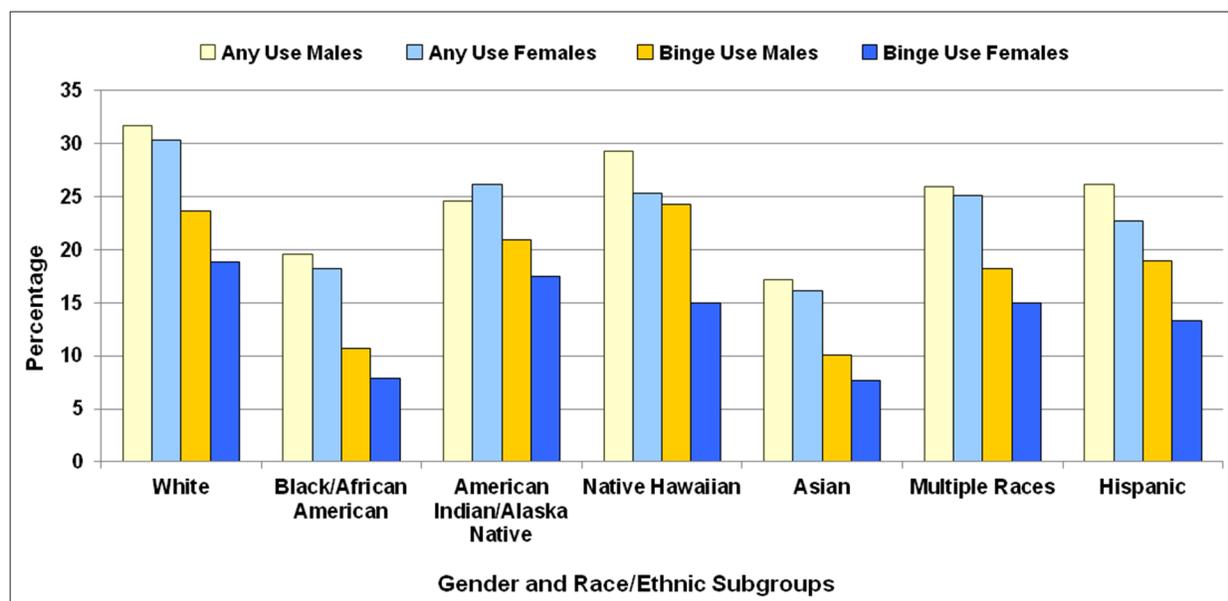
²⁰ Note that the percentage rate scale (y-axis) differs among the four exhibits (A-D) above so that the distinctions between males and females within each age group can be easily read. The percentages reflected in each exhibit are the actual percentages.

Underage Drinking by Race and Ethnicity

According to 2002–2012 NSDUH data,²¹ Whites ages 12 to 20 were more likely to report current alcohol use than any other race or ethnic group. An estimated 31.7 percent of White males and 30.3 percent of White females reported past-month use, followed by Native Hawaiian or Other Pacific Islander males (29.3 percent), Hispanic or Latino males (26.2 percent), American Indian or Alaska Native females (26.2 percent), males of multiple races (26.0 percent), Native Hawaiian or Other Pacific Islander females (25.3 percent), females of multiple races (25.1 percent), American Indian or Alaska Native males (24.6 percent), Hispanic or Latino females (22.7 percent), Black or African American males (19.6 percent), Black or African American females (18.2 percent), Asian males (17.2 percent), and Asian females (16.1 percent).

As shown in Exhibit 2.10, 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, 2013c). Although fewer Blacks report current drinking, data from the 2011 YRBS suggest that prevalence of alcohol use before age 13 is greater among Black students (21.8 percent) and Hispanic students (25.2 percent) than among White students (18.1 percent) (CDC, 2012b). 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.

Exhibit 2.10: Alcohol Use and Binge Drinking in the Past Month among Persons Ages 12–20 by Race/Ethnicity and Gender, Annual Averages Based on 2002–2012 Data (SAMHSA, 2013c)



²¹ 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 (2002–2012) 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 24.3 percent of Native Hawaiians or Other Pacific Islander males reported having five or more drinks on the same occasion on at least 1 day within the past 30 days, followed closely by White males (23.7 percent) and American Indian or Alaska Native males (20.9 percent). Hispanic males (19.0 percent), White females (18.9 percent), males of multiple races (18.2 percent), and American Indian or Alaska Native females (17.5 percent) reported similar rates of binge drinking, followed by females of multiple races (15.0 percent), Native Hawaiian or Other Pacific Islander females (15.0 percent), Hispanic females (13.3 percent), Black males (10.7 percent), Asian males (10.1 percent), and Asian females (7.7 percent).

As Exhibit 2.10 shows, rates of binge drinking were higher for males than females for each race/ethnic group, with the differences being greatest among Native Hawaiian or Other Pacific Islanders (males 24.3 percent versus females 15.0 percent) and Hispanics (males 19.0 percent versus females 13.3 percent) (SAMHSA, 2013c).

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

Underage alcohol use is strongly affected by the context in which drinking occurs, including the number of people present and the location where drinking takes place. Of particular concern is underage drinking at large parties.

Number of People Present at Drinking Event

Most (81.0 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, 14.0 percent were with one other person the last time they drank, and 5.1 percent were alone.²² 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 (4.5 drinks) than did those who drank with one other person (3.0 drinks) or drank alone (2.7 drinks) (SAMHSA, 2013c; Pemberton, Colliver, Robbins, & Gfroerer, 2008).

The number of people present at the last drinking event appears to differ across age groups. Among current drinkers, youths ages 12 to 14 were more likely to have been alone (11.6 percent) or with one other person (23.3 percent) the last time they drank compared with youths ages 15 to 17 (5.8 percent alone and 12.7 percent with one other person) or ages 18 to 20 (4.2 percent alone and 13.8 percent with one other person) (SAMHSA, 2013c). In all age groups, underage current

²² The discussion in this section combines data for 2011 and 2012.

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 2.11).

Most male and female underage drinkers were with two or more other people on their last drinking occasion. However, male drinkers were more likely to drink with two or more people (83 percent) than female drinkers (4.0 percent). On the other hand, male drinkers were more likely to drink alone (6.4 percent) than were female drinkers (3.3 percent).

Overall, underage persons who drank with two or more other people consumed more drinks on average (4.5) than did those who drank alone (2.7) or with one other person (3.0). There were no significant differences in the mean number of drinks consumed between those who drank alone and those who drank with one other person. Males consumed more drinks than did females among those who drank with one or more people but not among those who drank alone. For example, when the last drinking occasion was with two or more other people, males averaged 5.3 drinks, compared with 3.8 drinks for females (SAMHSA, 2013c).

Location of Alcohol Use

Most underage drinkers reported last using alcohol in someone else's home (55.7 percent, averaging 4.7 drinks) or their own home (29.7 percent, averaging 3.7 drinks).²³ The next most popular drinking locations were at a restaurant, bar, or club (7.9 percent, averaging 4.8 drinks); at a park, on a beach, or in a parking lot (4.5 percent, averaging 4.8 drinks); or in a car or other vehicle (4.1 percent, averaging 5.4 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 6.2 drinks (SAMHSA, 2013c). 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.

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 (36.8 percent) than were older adolescents (25.4 percent for 15- to 17-year-olds and 31.1 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 (49.3 percent) than the 15- to 17-year olds (60.6 percent) but were similar to 18- to 20-year-olds (54.1 percent).

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 (10.4 percent for those ages 18 to 20 versus 2.1 percent for those ages 12 to 14 and 3.1 percent for those ages 15 to 17) (Exhibit 2.12) (SAMHSA, 2013c). 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 (9.8 percent versus 6.1 percent).

²³ For the analyses in this section, 2011 and 2012 NSDUH data are combined to provide sufficient sample sizes.

Exhibit 2.11: Average Number of Drinks Consumed on Last Occasion of Alcohol Use in the Past Month among Past-Month Alcohol Users Ages 12–20, by Social Context and Age Group: Annual Averages Based on 2011–2012 Data (SAMHSA, 2013c)

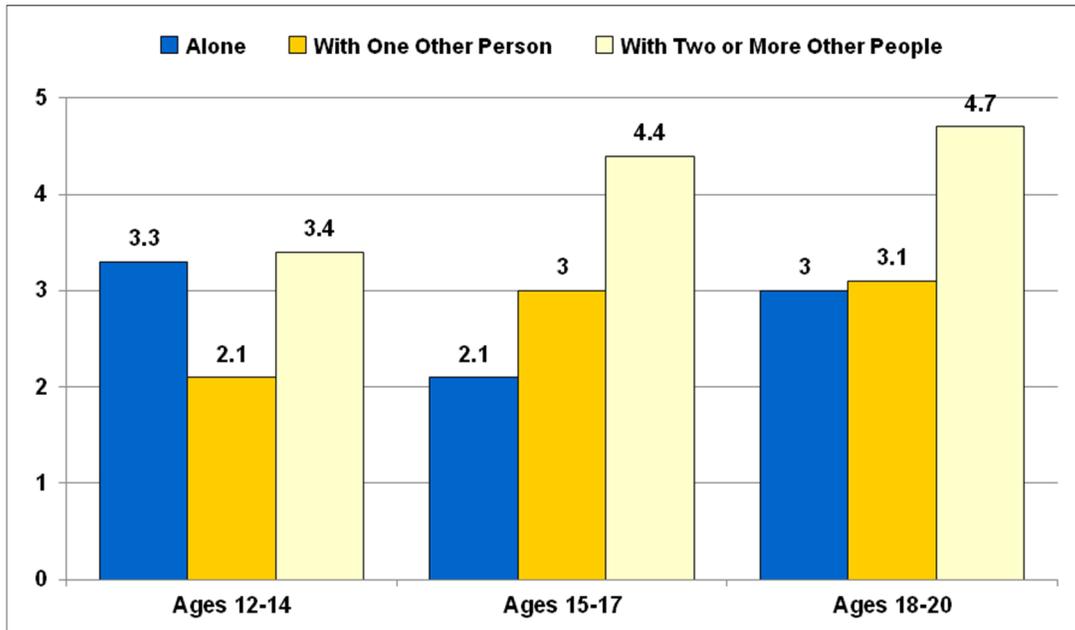
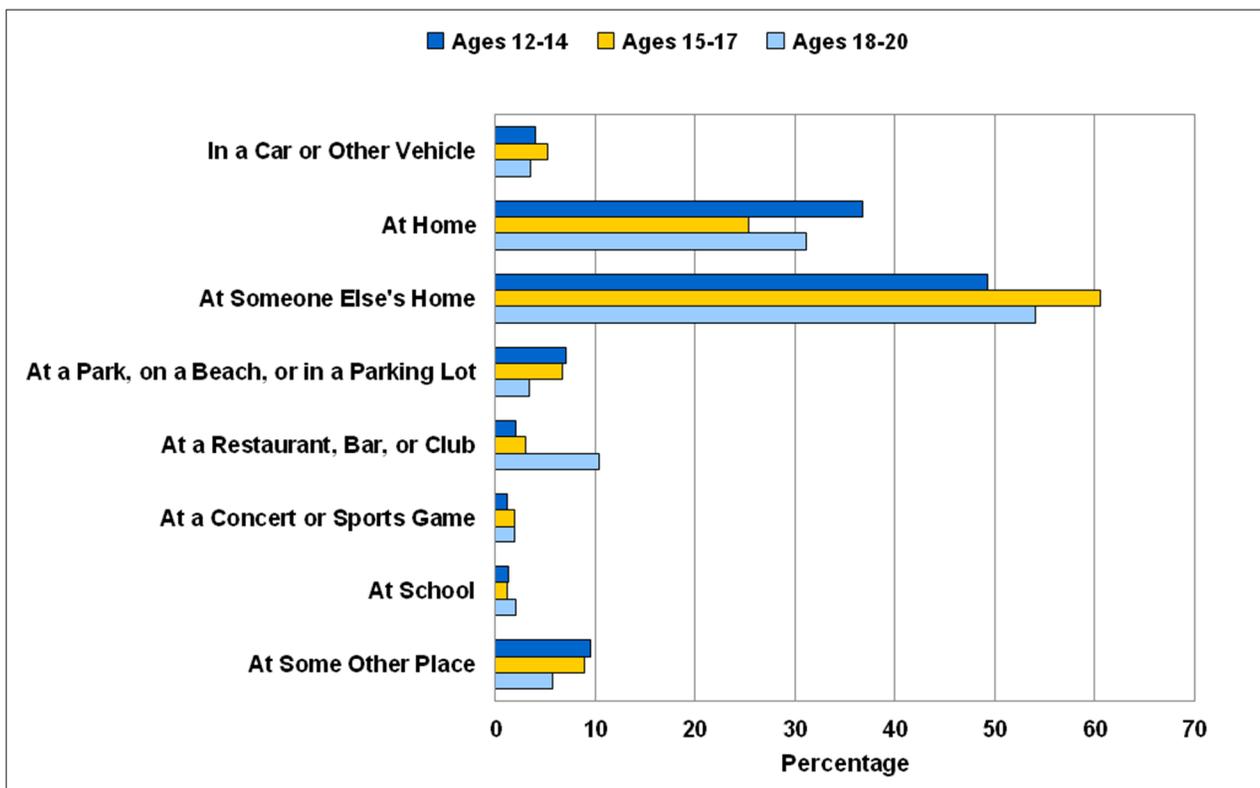


Exhibit 2.12: Drinking Location of Last Alcohol Use among Past-Month Alcohol Users Ages 12–20 by Age Group: Annual Averages Based on 2011–2012 Data (SAMHSA, 2013c)



Underage Drinking Parties

The data cited above suggest that underage drinking occurs primarily in a social context (three or more drinkers) at private residences. Such drinking occasions include parties at which large numbers of youth are present. Drinking parties attract those 21 and over as well as significant numbers of underage drinkers (Wells, Graham, Speechley, & Koval, 2005). For this reason, parties are a common environment in which young drinkers are introduced to heavy drinking by older and more experienced drinkers (Wagoner et al., 2012).

Parties are settings for binge drinking and other patterns of consumption leading to high BACs (Wagoner et al., 2012; Clapp, Reed, Holmes, Lange, & Voas, 2006; Clapp, Min, Shillington, Reed, & Croff, 2008; Paschall & Saltz., 2007; Usdan, Moore, Schumacher, & Talbott, 2005; Demers et al., 2002). Factors that increase the risk of high BACs include size of the party and the number of people drinking (Wagoner et al., 2012), drinking games (Clapp et al., 2006, 2008), “BYOB” (Clapp et al., 2006), parties sponsored by fraternities (Paschall & Saltz, 2007), and parties where illicit drugs are available (Clapp et al., 2006). Demers and colleagues (2002) suggest that large parties have a greater facilitative effect on men’s drinking than on women’s. Drinking parties are settings for aggression, including serious arguments, pushing, fights, and sexual assault (Wagoner et al., 2012). Because large numbers of youth are drinking outside their own homes, drinking parties may significantly increase the risk of driving after drinking (PIRE, 2000).

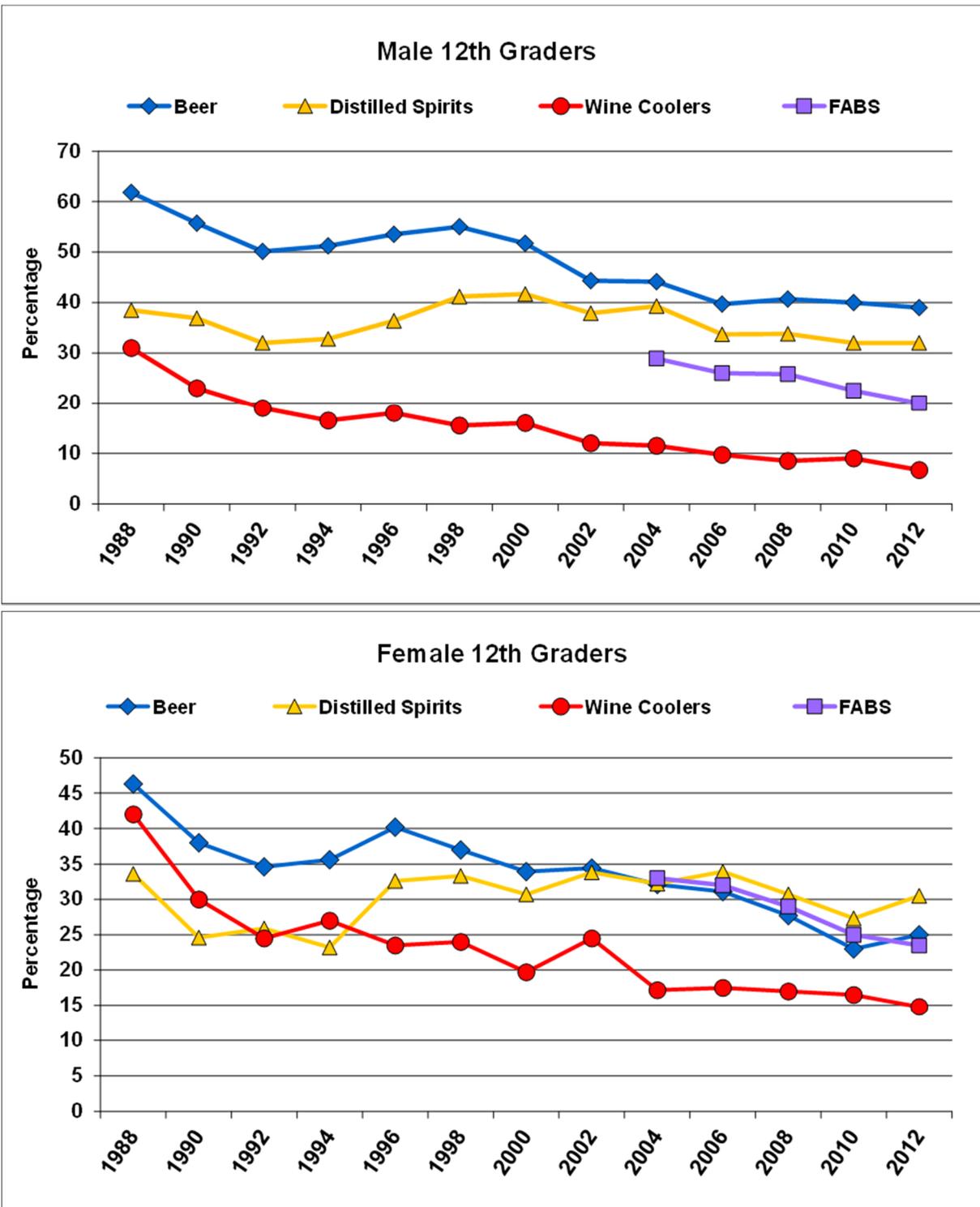
Drinking parties pose serious problems for law enforcement officers. These include breaking up parties without allowing drinkers to flee to their cars (PIRE, 2000), processing large numbers of underage offenders (PIRE, 2000), and identifying the individuals who have furnished alcohol to minors (Wagoner et al., 2012). For information on party-related enforcement practices states are implementing, see Chapter 4. For information on relevant state legal policies see “Hosting Underage Drinking Parties” and “Keg Registration” in Chapter 4.

Types of Alcohol Consumed by Underage Drinkers

Different alcohol beverage types are likely associated with different patterns of underage consumption. Ease of concealment, palatability, alcohol content, marketing strategies, media portrayals, parent modeling, 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. Since 1988, preferences have shifted markedly for both male and female 12th graders (Exhibit 2.13). Wine is now preferred by 13 percent or fewer of underage drinkers and is not discussed here.

In 1988, beer was the preferred beverage for both sexes by a large margin. However, by 2013, preference for beer had declined and preference for distilled spirits had increased. Preference for spirits is now equal to preference for beer among males; females now prefer spirits to beer by a slight margin. In 2004 (the first year flavored alcoholic beverages were included in the survey), females preference for beer, distilled spirits and flavored alcoholic beverages were about the same. Their preference for flavored alcoholic beverages has declined steadily since then. Male preference for these beverages, which has not been as high as female preference, also declined during this period.

Exhibit 2.13: Trends in the Percentage of Male and Female 12th Graders Using Alcoholic Beverages by Beverage Type, 1988–2012 (Johnston et al., 2013b)



Note: Although there is no longer a meaningful difference between wine cooler and flavored alcoholic beverages in either their manufacturing process or their taste profile, since the MTF survey asks respondents about the two categories separately, they are presented that way.

Data from eight states indicated that, among students in 9th through 12th grades who reported binge drinking, liquor was the most prevalent beverage type (Siegel, Naimi, Cremeens, & Nelson, 2011).

Alcohol Use in College Is Pervasive and Heavy

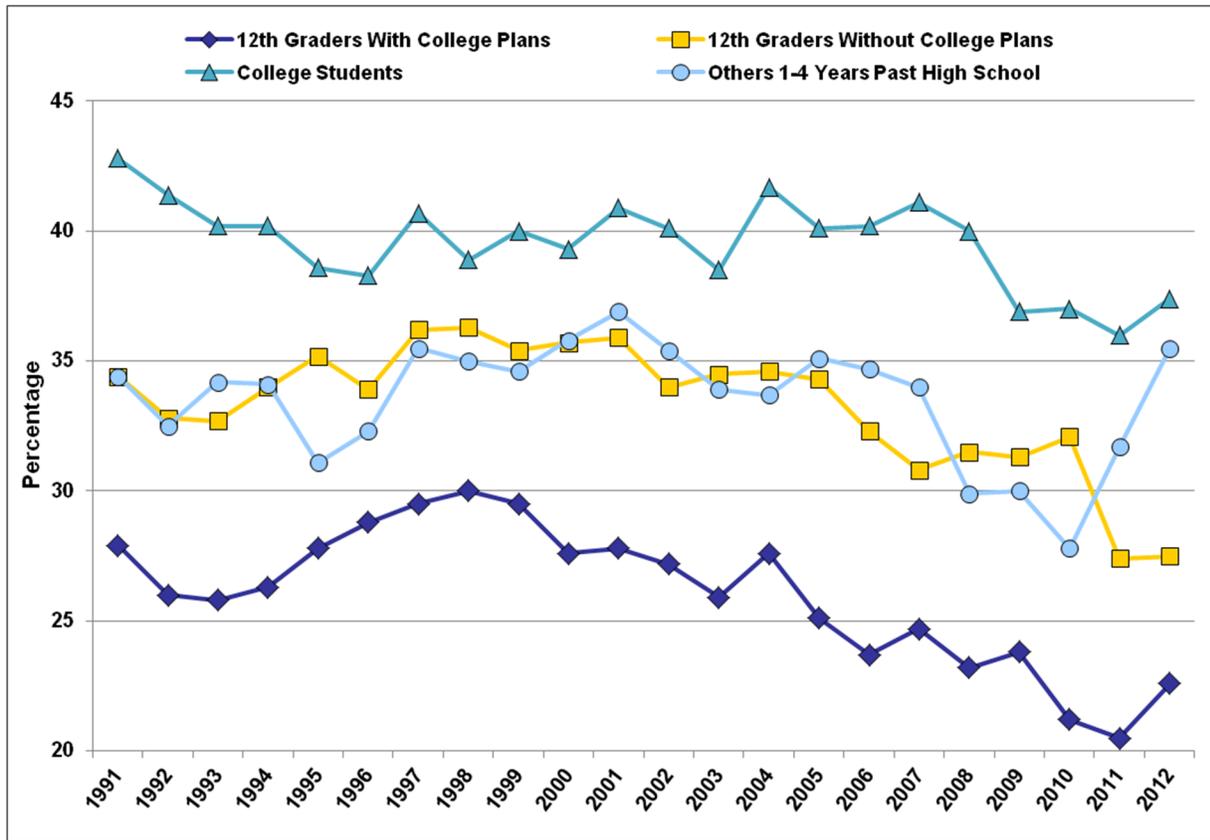
Although colleges and universities vary widely in their student binge-drinking rates, overall rates of college student drinking and binge drinking exceed those of age peers who do not attend college (Johnston et al., 2013c). Of college students, 81.0 percent drink and 37.4 percent report drinking five or more drinks on an occasion in the past 2 weeks. Unlike high school students and same-age peers not in college, binge-drinking rates among college students have shown little decline since 1993 (Johnston et al., 2013c). These differences are not easily attributable to differences between college attendees and nonattendees. Although college-bound 12th graders are consistently less likely than non-college-bound counterparts to report heavy drinking, college students report higher rates of binge drinking than college-age youth who are not attending college (Exhibit 2.14) (Johnston, O'Malley, Bachman, & Schulenberg, 2013c). This finding suggests that college environments influence drinking practices (Hingson et al., 2002; Kuo, Wechsler, Greenberg, & Lee, 2003). Considering binge drinking trends for only “12th Graders with College Plans” and “College Students,” the slopes of the two trend lines are diverging noticeably. In other words, college students are now drinking more than 12th graders with college plans than they did in past years. This finding suggests that the impact of the college transition may be increasing over time.

The consequences of underage drinking in college, discussed in detail in this chapter under “Adverse Consequences of College Drinking,” are widespread and serious. About 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 bingeing (three or more times in the past 2 weeks) (NIAAA, 2002a). Underage college students drink about 48 percent of the alcohol consumed by students at 4-year colleges (Wechsler, Lee, Nelson, & Kuo, 2002). Some college students far exceed the binge criterion of five drinks per occasion (Wechsler, Molnar, Davenport, & Baer, 1999; Wechsler & Nelson, 2008).

Alcohol Is Perceived as Readily Available by the Underage Population

The relationship between alcohol availability, levels of consumption, and occurrence of alcohol-related problems is well documented in the Surgeon General’s *Call to Action* (U.S. Department of Health and Human Services, 2007). As shown in Exhibit 2.15, most teens see alcohol as readily available. In 2012, 57.5 percent of 8th graders, 78.2 percent of 10th graders, and 90.6 percent of 12th graders said alcohol would be “fairly easy” or “very easy” to get (Johnston et al., 2013a). Perceived availability, however, has declined in some groups. In 1992, 76.2 percent of 8th graders perceived alcohol as easily available, but by 2012 only 57.5 percent held that perception. For 10th graders, perception of availability peaked in 1996 at 90.4 percent, but by 2012 had declined to 78.2 percent. Data for 12th graders, first collected in 1999, show that 95.0 percent perceive alcohol to be readily available—a percentage that has declined only slightly since then. These reductions in perceived availability may be attributable in part to

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: 1991–2012 (Johnston et al., special runs, January 2010; 2011a,b; 2012a,b; 2013a,c)

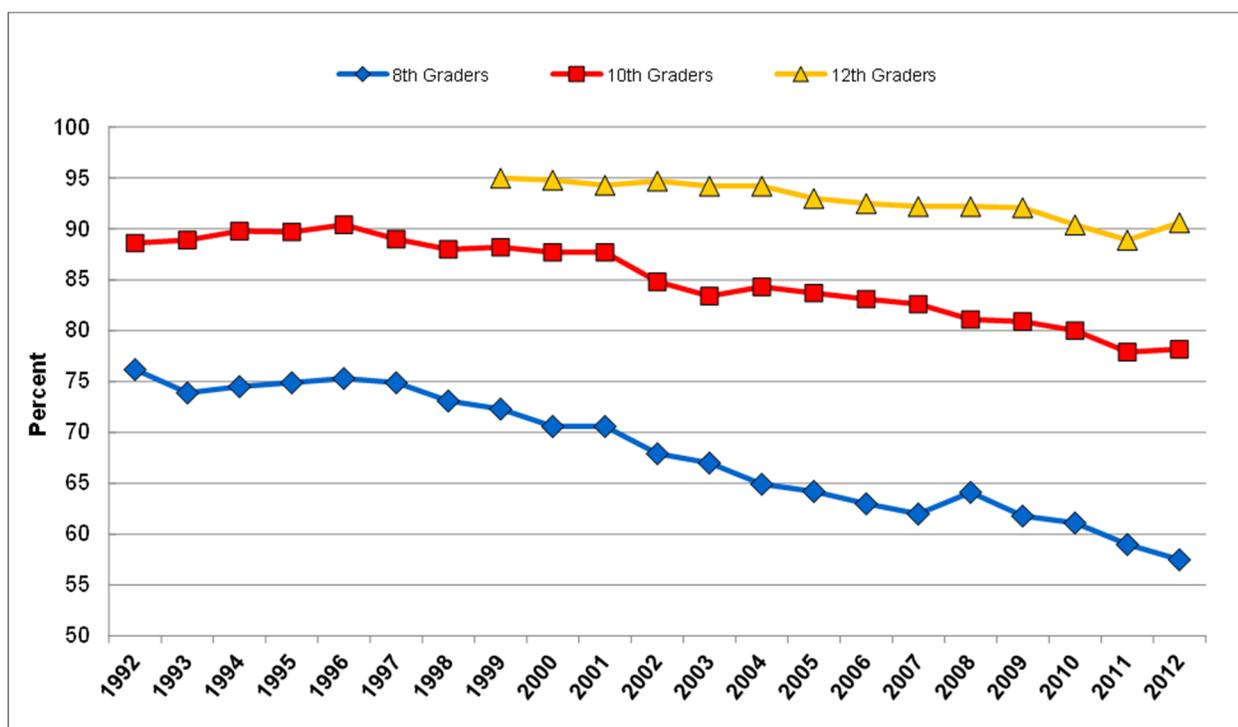


policies and enforcement practices described in Chapter 4.3 (see “Laws Addressing Minors in Possession of Alcohol,” “Laws Targeting Alcohol Suppliers,” and “Alcohol Pricing Policies”).

Alcohol Is Available from a Variety of Sources

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 2011 and 2012 show that among all underage current drinkers, 29.3 percent paid for alcohol the last time they drank (7.6 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 5.5 drinks) than those who did not (average of 3.7 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, 70.7 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, percent got the alcohol from a parent or guardian, 9.3 percent got it from another family member age 21 or older, and 4.5 percent took it from their own home.

Exhibit 2.15: Trends in Availability of Alcohol as Perceived by 8th, 10th, and 12th graders (Johnston et al., 2013a)

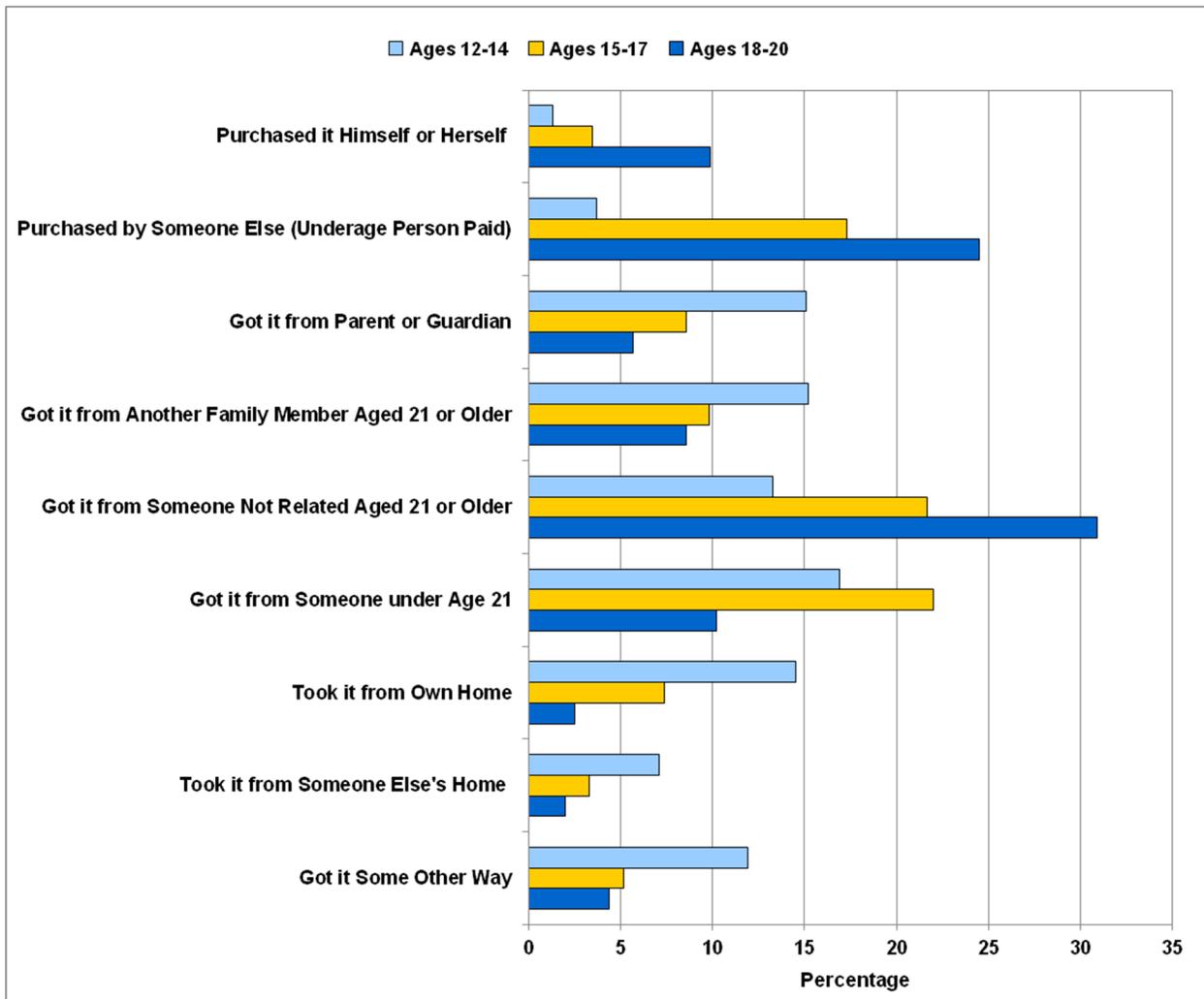
Note: Although the MTF survey asks respondents about wine cooler and flavored alcoholic beverages separately, the data are combined here because there is no longer a meaningful difference between the two categories in either their manufacturing process or their taste profile.

The most common sources of alcohol varied substantially by age as shown in Exhibit 2.16. For youths ages 12 to 14, the most common sources were receiving it free from someone under age 21 (16.9 percent), from another family member age 21 or older (15.2 percent), or from a parent or guardian (15.1 percent). For youths ages 15 to 17, the most common sources were receiving it free from an unrelated person age 21 or older (21.7 percent) or from someone under age 21 (22.0 percent), and giving somebody else money to purchase the alcohol (17.3 percent).

Among 18- to 20-year-olds, most current drinkers either received alcohol for free from an unrelated person age 21 or older (30.9 percent) or gave somebody else money to purchase the alcohol (24.5 percent) (SAMHSA, 2013c). Older underage persons were more likely to have paid for alcohol themselves (either purchasing it themselves or paying someone else to purchase it) on their last drinking occasion: 34.7 percent of 18- to 20-year-olds did so compared with 21.1 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 (34.6 percent) than their female counterparts (23.6 percent) (SAMHSA, 2013c).²⁴

²⁴ More detailed information can be found in the special report by Pemberton, Colliver, Robbins, & Gfroerer (2008).

Exhibit 2.16: Source of Last Alcohol Used among Past-Month Alcohol Users Ages 12–20, by Age Group: 2011–2012 (SAMHSA, 2013c)



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

To date, the Federal Trade Commission has conducted four 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 FTC 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 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,

FTC recommended that the industry raise the placement standard and measure compliance against reliable up-to-date audience composition data.²⁵

- *2003 FTC 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.²⁶
- *2008 FTC Alcohol Report:* In 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 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.²⁷
- *2014 FTC Alcohol Report:* In 2014, the FTC published its fourth study of alcohol advertising.²⁸ Data showed that 93.1 percent of placements made by the companies in measured media (including internet media owned by others, such as news, entertainment, and sports) during the first half of 2011 met the 70 percent 21+ audience composition standard then in effect. When data were aggregated across companies and media, 85.4 percent of the audience for alcohol advertising consisted of persons 21+. The audiences for the major social media (Facebook, Twitter, and YouTube) exceed 70 percent 21+; Facebook further limits alcohol ad viewing to persons who previously registered as 21+, and Twitter and YouTube offer age-gating technologies. In mid-2011, the industry adopted a 71.6 percent adult placement standard for future placements. The report also evaluates product placement in entertainment media.

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) demonstrated this relationship at the population (state)

²⁵ For more information, see *Self-Regulation in the Alcohol Industry* (FTC, 1999), available at <http://www.ftc.gov/reports/alcohol/alcoholreport.htm>.

²⁶ For more information, see *Alcohol Marketing and Advertising* (FTC, 2003), available at <http://www.ftc.gov/os/2003/09/alcohol08report.pdf>.

²⁷ For more information, see *Self-Regulation in the Alcohol Industry* (FTC, 2008), available at <http://www.ftc.gov/os/2008/06/080626alcoholreport.pdf>.

²⁸ For more information, see *Self-Regulation in the Alcohol Industry* (FTC, 2014), available at <http://www.ftc.gov/reports/self-regulation-alcohol-industry-report-federal-trade-commission-0>.

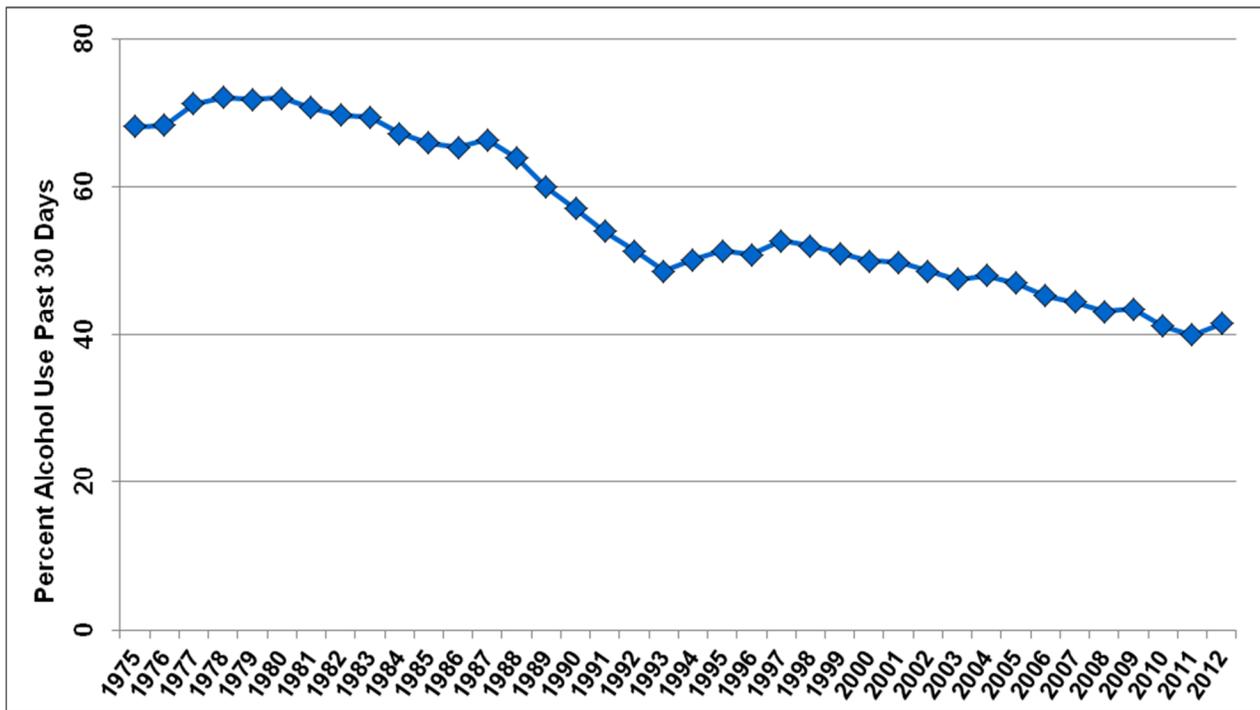
level. State estimates of youth and adult current drinking and binge drinking from 1993 through 2005 were significantly correlated when pooled across years. These results suggest that some policies that primarily affect adult drinkers (e.g., pricing and taxation, hours of sale, on-premises drink promotions) may affect underage drinking.

Despite Meaningful Progress, Underage Drinking Remains Unacceptably High

Available data from 1975 to 2012 document that the prevalence of drinking among 12th graders peaked in 1978 for lifetime use and past-year use (Johnston et al., 2013a). 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 from 2007 to 2012 (Johnston et al., 2009a, 2013a). Past-month use among 12th graders increased from 1975 to 1978, decreased slightly from 1978 to 1988, decreased from 1988 to 1993, increased from 1993 to 1997, decreased from 1997 to 2002, remained steady from 2002 to 2005, and has decreased slightly since then (Johnston et al., 2009a,c; 2013a) (Exhibit 2.17).

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 of 1983 to a low 27.5 percent in 1993—a decrease of almost one third, and thus a significant improvement (Johnston et al., 2009a). From 1993 to 1998, binge drinking rose by about 4 percentage points among 12th graders. After increasing to 32 percent in 1998, the rate among 12th graders dropped to 25 percent by 2006, where it remained through

Exhibit 2.17: Trends in 30-Day Prevalence of Alcohol Use for 12th Graders, 1975–2012 (Johnston et al., 2013a)



2009; it then declined significantly to 22 percent by 2011—a new low (Johnston et al., 2012a). In 2012 there was a statistically significant increase to 23.7 percent (Johnston et al., 2013a). An upward drift in binge drinking among 8th graders occurred from 1991 (10.9 percent) to 1996 (13.3 percent) and among 10th graders from 1991 (21.0 percent) to 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, there have been statistically significant declines in bingeing for all three grades (Johnston et al., 2012a). 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 & Fay, 2004, p. 1393). These authors continue, “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.” 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. According to the *Call to Action*, about 5,000 people under age 21 die annually from alcohol-related injuries involving underage drinking. Underage drinking also results in enormous economic costs. In 2006, almost \$24.6 billion (about 11 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 (58 percent of the total cost), law enforcement and other criminal justice expenses related to excessive alcohol consumption (19 percent of the total), health care expenses for problems caused by excessive drinking (15 percent of the total), and motor vehicle crash costs from impaired driving (6 percent of the total cost). Most productivity losses (28 percent) were due to deaths from alcohol-attributable conditions involving underage youth (Bouchery, Harwood, Sacks, Simon, & Brewer, 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).

Driving After Drinking

The greatest mortality risk for underage drinkers is motor vehicle crashes. In 2012, of the 1,875 drivers ages 15 to 20 who were killed in motor vehicle traffic crashes,

- 534 (28 percent) had a BAC of 0.01 or higher.
- 75 (4 percent of all fatally injured drivers this age) had a BAC of 0.01 to 0.07 g/dL.

- 459 (24 percent of fatally injured drivers this age) had a BAC of 0.08 g/dL or higher (National Center for Statistics and Analysis, 2013).

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 2012 is shown in Exhibit 2.18. Relative to adults, young people who drive after drinking have an increased risk of alcohol-related crashes because of their increased impairment from a given amount of alcohol and, perhaps because of their relative inexperience behind the wheel. 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 in 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 2012 NSDUH survey provides data on the number of youth by age who reported driving after drinking at least once in the past year (Exhibit 2.19) (SAMHSA, 2012b). As can be seen in the exhibit, this behavior increases steadily with age.

O'Malley and Johnston (2013) report longitudinal data for high school seniors (previous 2 weeks) on driving after drinking any alcohol and after five or more drinks, and being a passenger when the driver has had any alcohol and has had five or more drinks (Exhibit 2.20). As can be seen in the exhibit, all four of these behaviors have declined in the last decade, but remain unacceptably high, especially given the risks associated with driving after even small amounts of alcohol (see above). Males were about twice as likely to report driving after drinking than were females (males=8.3%, females=3.5%, $p>.001$), a finding replicated in other recent studies (CDC, 2012b; Quinn & Fromme, 2012a). Very high percentages of high school seniors who drove after drinking five or more drinks experienced consequences. O'Malley and Johnston (2013) report that 43.2 percent received a ticket or warning and 30.2 percent were involved in a crash.

Exhibit 2.18: 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 2012
(National Center for Statistics and Analysis, 2013)

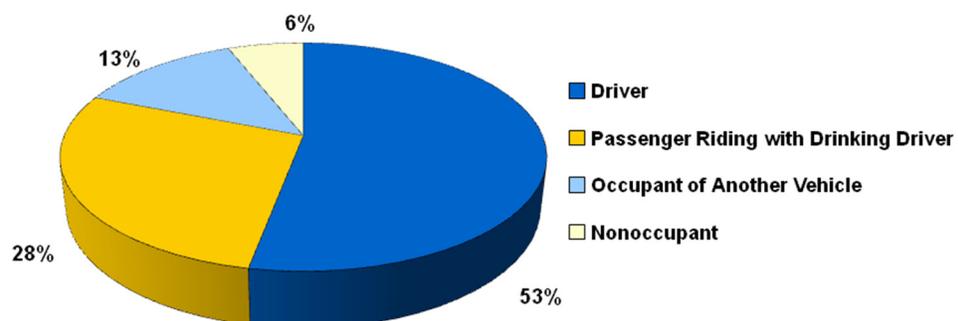


Exhibit 2.19: Percentage of Drivers Ages 16–20 Reporting Driving After Drinking At Least Once in the Past Year by Age: 2012 (SAMHSA, 2013b)

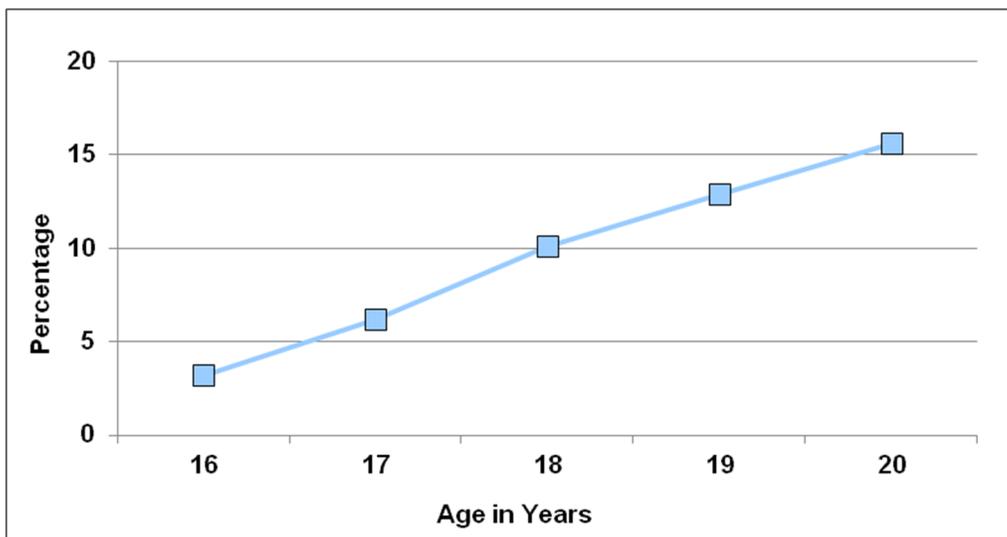
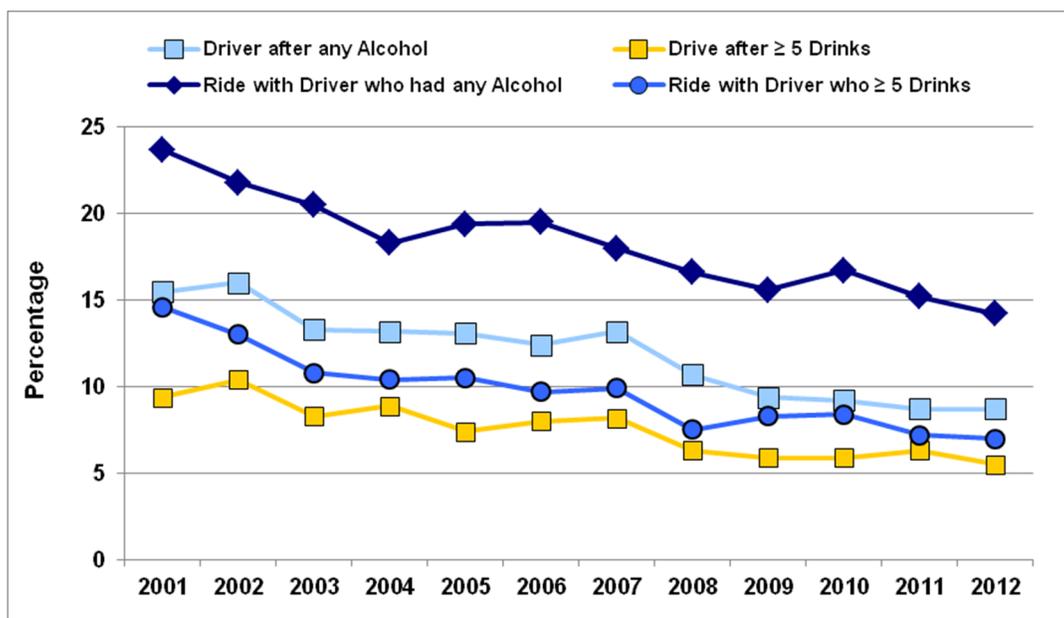


Exhibit 2.20: Trends in Percentage of 12th Graders Reporting Driving after Alcohol Use or Riding after Alcohol Use by the Driver (O’Malley & Johnston, 2013; Special MTF Run, 2013)



As is the case with many adolescent risk behaviors, demographic factors associated with driving after drinking include academic performance, truancy, and religious commitment (O’Malley & Johnston, 2013). A 2011 study (LaBrie, Kenney, Mirza, & Lac, 2011) found that fraternity and sorority membership increased driving after drinking, but a similar study in 2012 failed to find such an effect (LaBrie, Napper, & Ghaidarov, 2012). Data for the 2012 study came from a college at which group transportation is provided to off-campus Greek-sponsored events, and the

locations of the events is not disclosed. The authors speculate that the failure to find an association between driving after drinking and fraternity and sorority membership at the 2012 study college resulted from these policies. These two studies found normative effects with higher rates of driving after drinking reported by students who perceived more favorable norms concerning driving after drinking for close friends and typical students.

An obvious but underappreciated fact is that access to cars is a prerequisite for this behavior (see, e.g., Klitzner et al., 1988). O'Malley and Johnston (2013) addressed this directly: high school seniors who drive more frequently are more likely to drink after driving. The behavior is also associated with factors that may relate to access to cars and driving frequency. These include living off campus (Quinn & Fromme, 2012b), spending more evenings out (O'Malley & Johnston, 2013), higher SES, and driving someone's car without permission (Delcher, Johnson, & Maldonado-Molina, 2013). Graduated driver's license policies (see Chapter 4) limit the extent to which young people drive and the conditions under which they drive. Use/lose policies revoke driving privileges among young people convicted of an alcohol offense. Cavazos-Regh and colleagues (2012) found that students in states with strong GDL laws and the most restrictive use/lose laws were significantly less likely to report driving after drinking.

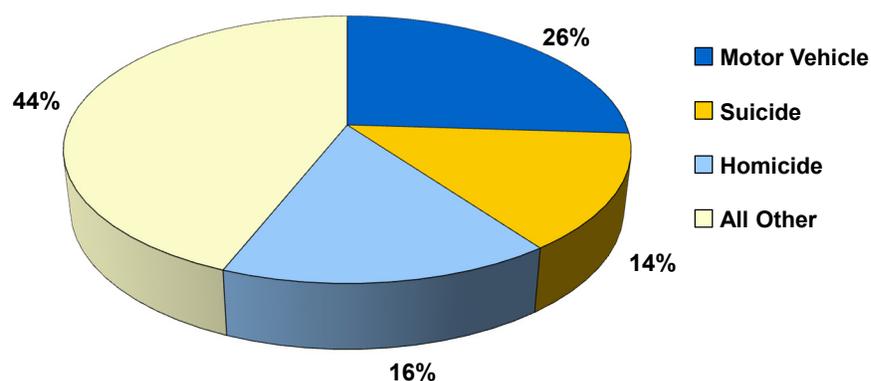
Other Unintentional Injuries such as Burns, Falls, and Drowning

Motor vehicle traffic crashes, homicide, and suicide are the three leading causes of death among youths ages 12 to 20 (Exhibit 2.21). In addition to motor vehicle crashes, underage drinking contributes to all major causes of fatal and nonfatal trauma experienced by young people. In 2010, 2,590 youths ages 12 to 20 died from unintentional injuries other than motor vehicle crashes, such as poisoning, drowning, falls, burns (CDC, 2013b). Research suggests that about 40 percent of these deaths were attributable to alcohol (Smith, Branas, & Miller, 1999).

Suicide, Homicide, and Violence

Data from 17 states shows that among suicide decedents tested who were ages 10 to 19 (all of whom were under the legal drinking age in the United States), 12 percent had BACs >0.08 g/dL (Crosby, Espitia-Hardman, Hill, & Ortega, 2009). One study (Smith, Branas, & Miller, 1999)

Exhibit 2.21: Leading Causes of Death for Youth Ages 12–20: 2010 (CDC, 2013b)



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 attributable to alcohol (i.e., involved a decedent with a BAC of 0.10 g/dL or greater). Another study focused on youth suicide estimated that 9.1 percent of hospital-admitted suicide acts by those under age 21 involved alcohol and that 72 percent of these cases were attributable to alcohol (Miller, Levy, Spicer, & Taylor, 2006).

Police and child protective services records suggest that those under age 21 commit 30 percent of murders, 31 percent of rapes, 46 percent of robberies, and 27 percent of other assaults (Miller et al., 2006). As the authors note, relying on victim reports rather than agency records would yield higher estimates. For the population as a whole, an estimated 50 percent of violent crime is related to alcohol use by the perpetrator (Harwood, Fountain, & Livermore, 1998). The degree to which violent crimes committed by those under 21 are alcohol related is yet unknown.

Years of Potential Life Lost Due to Alcohol

Persons under age 21 who die as a result of alcohol use lose an average of 60 years of potential life (CDC, 2013a). 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) because these are primarily diseases of older adults.

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 intellectual disabilities (Warren & Bast, 1988; Stratton, Howe, & Battaglia, 1996; Jones, Smith, Ulleland, & Streissguth, 1973). A review article by Nolen-Hoeksema cites a number of studies suggesting that underage drinking by both victim and assailant increases the risk of physical and sexual assault (Nolen-Hoeksema, 2004; Abbey, 2011).

Adverse Consequences of College Drinking

Abbey, Ross, McDuffie, and McAuslan (1996) reported that over half of college women respondents had experienced some form of sexual assault. Respondents characterized slightly less than one third of these assaults as attempted or completed rapes. However, the incidence of college sexual assaults is difficult to measure, and different studies report different rates. A review by Abbey (2011) of three relevant studies (Abbey, Zawacki, Buck, Clinton, & McAuslan, 2004; Seto & Barbaree, 1995; Testa, 2002) concludes that approximately half of all reported and unreported sexual assaults involve alcohol consumption by the perpetrator, victim, or both. Abbey further reports that, typically, if the victim consumes alcohol, the perpetrator does as well. Estimates of perpetrators' intoxication during the incident ranged from 30 percent to 75 percent.

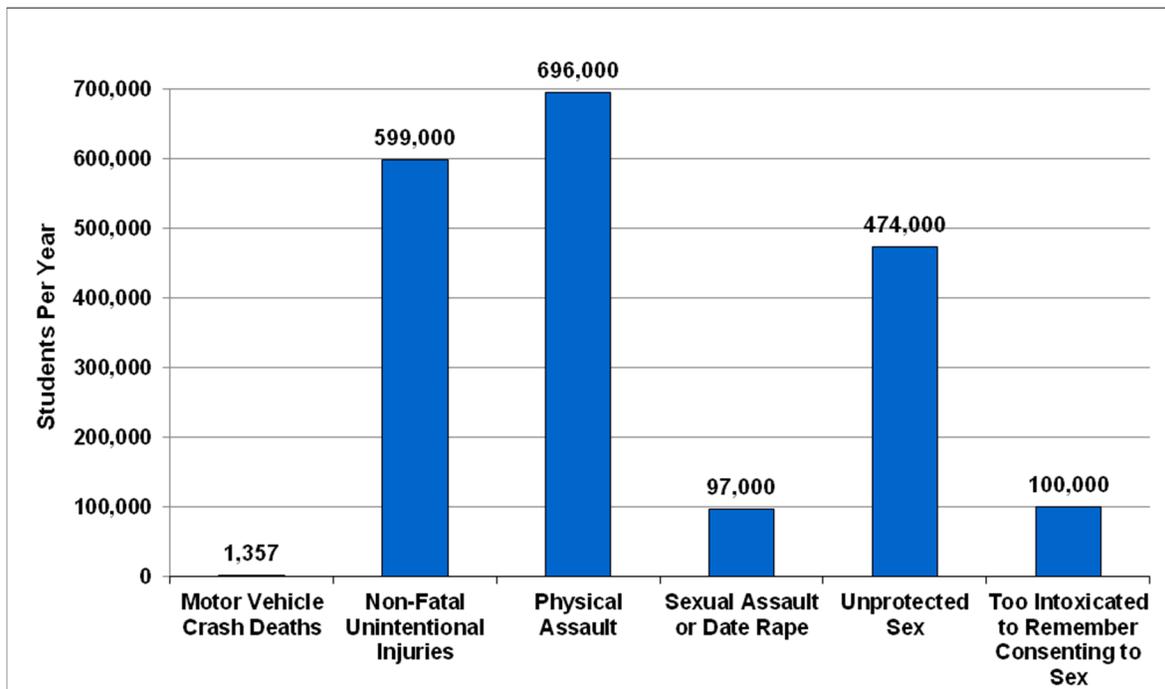
Many other adverse social consequences are linked with college alcohol consumption. Hingson and Zha (2009) estimated that annually more than 696,000 college students were assaulted or hit by another student who had been drinking; another 599,000 were unintentionally injured while

under the influence of alcohol. Research suggests that roughly 474,000 students ages 18 to 24 have unprotected sex due to drinking, and each year more than 100,000 students ages 18 to 24 report having been too intoxicated to know if they consented to having sex (Exhibit 2.22). About 25 percent of college students report academic consequences 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, Heeren, Winter, & Wechsler, 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, 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 are supported by longitudinal analyses (Squeglia, Jacobus, & Tapert, 2009).

Exhibit 2.22: Prevalence of Alcohol-Related Morbidity and Mortality among College Students Ages 18–24 (calculated using methods presented in Hingson et al., 2005, 2009)



Impaired Academic Performance

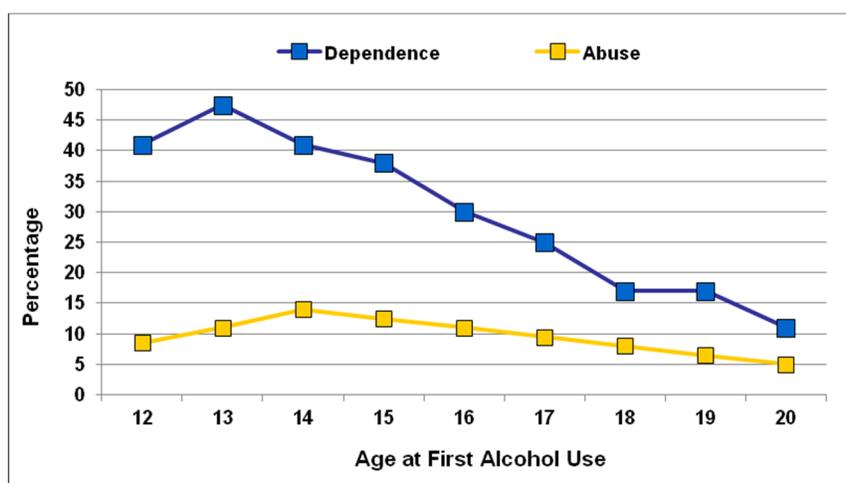
Underage drinking including binge drinking affects academic performance. Students who reported binge drinking were three times more likely to report earning mostly Ds and Fs on their report cards compared with non-binge drinkers (Miller et al., 2007).

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 as a risk factor for the development of alcohol-related problems in adulthood (Agrawal et al., 2009; Dawson et al., 2008; 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.²⁹ 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 2.23). Data from the 2009–2011 NSDUH survey suggest a similar relationship between age of initiation and development of alcohol-related problems. Only 10 to 11 percent of persons who started at age 21 or older met the criteria.

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.

Exhibit 2.23: Ages of Initiation and Levels of DSM Diagnoses for Abuse and Dependence (Grant & Dawson, 1997)



²⁹ The new criteria for alcohol-related disorders in the DSM-V (APA, 2013) do not specifically address adolescents.

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 concept in this report.

Adolescence is the period between the onset of puberty³⁰ 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.

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, and media exposure). 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 and to what extent an adolescent will use alcohol. Internal and external factors influence each other in reciprocal ways as the adolescent's development unfolds over time. Youths are not uniformly at 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 many social systems in which adolescents operate. These different social systems both influence adolescents and are, in turn, influenced by adolescents (Bronfenbrenner, 1979). As shown in Exhibit 2.24, 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

³⁰ 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.

and may reinforce or counteract each other. Exhibit 2.24 represents the multiple systems in which adolescents are embedded. Their relative influences vary across development.

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 roles 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.

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. Some of the most important developmental findings included in the *Call to Action* are discussed below.

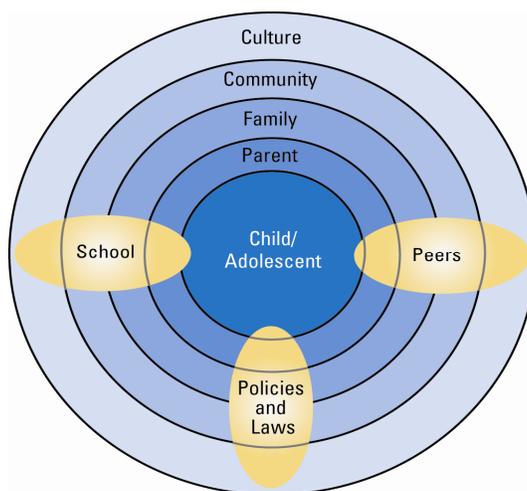
The Developing Adolescent Brain

During adolescence, dramatic changes to the brain’s structure, neuron connectivity (“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

Exhibit 2.24: Systems That Influence Adolescent Behavior (U.S. Department of Health and Human Services, 2007)



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, Schwandt, Newman, & Higley, 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, Stallings, Schmitz, Young, & Fulker, 1999); low harm avoidance (Jones & Heaven, 1998); and other risky behaviors in childhood and early adolescence may be associated with future heavy alcohol use and AUDs (Soloff, Lynch, & Moss, 2000).

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 also with other substances, and may also have a co-occurring mental disorder, interventions should be designed to address this complexity.

Family and Parental Influence

Children whose families include individuals who abuse alcohol are at increased risk for alcohol dependence throughout their lives. Genes account for over half the risk for alcohol dependence; environmental factors account for the rest. However, no single gene accounts for the majority of risk. 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).

Parental monitoring and parental attitudes and perceptions about drinking (such as seeing underage drinking as a rite of passage) have been shown to be very important influences on underage drinking. Studies have found that some parenting practices have proven beneficial in reducing adolescent alcohol use (Beck, et al., 2003; Ennet, et al., 2001; Resnick, et al., 1997; Watkins, et al., 2006). Parental monitoring, communication, and emotional support have a positive effect on adolescent alcohol use and are predictive of reduced adolescent alcohol problems (Ennet, et al., 2001; Wood, et al., 2004).

Sensitivity to 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, Brunell, Varlinskaya, & Spear, 2003; Little, Kuhn, Wilson, & Swartzwelder, 1996; Silveri & Spear, 1998; Varlinskaya & Spear, 2004; White et al., 2002; for review, see Spear, 2000, and Spear & 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. Also, in the case of driving, each drink increases impairment more for adolescents than for adults (Hingson & 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 using 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 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.

An advantage 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 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

As the data in this chapter demonstrate, characteristics of underage drinking such as age of initiation, current usage, and amounts consumed have fluctuated over the years. There is cause for some optimism, as the average age of first use has slowly risen while binge-drinking rates

show a gradual decline. Nevertheless, the overall rates of underage drinking remain unacceptably high, with the ability of youth to gain access to alcohol remaining relatively easy, particularly during the college years. The risks associated with this access are profound, resulting in traffic fatalities, injuries, suicides and homicides, and risky sexual behavior, as well as adverse effects on brain development and academic performance.